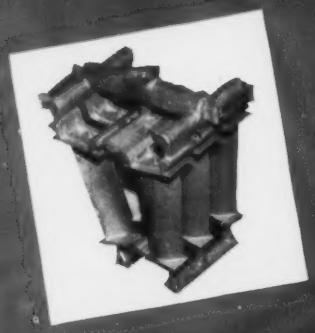
OCTOBER
1958

FOUNDRY

A PENTON PUBLICATION



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Highest quality Wyoming Bentonite for superior casting finish, YELLOWSTONE has higher green strength and permeability than competitive clays, and its lower bulk density results in significant savings when sands are formulated by volume. Plant location assures supply summer and winter.

At last, a consistent southern bentonite from a primary producer with assured supply! SOUTHERN STAR offers all of the important properties of a good southern bentonite, such as low dry strength, high green strength and excellent shake-out, plus it is compatible with western bentonite.

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SOUTHERN STAR

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SERVICE

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Extremely low-viscosity bentonite, AUTO BOND is pumpable with 25% greater additions, making it ideal for use in slurry systems in which mulling cycles are short. AUTO BOND eliminates the combining of western and southern bentonites and is perfect for iron and non-ferrous foundries.

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Whatever the direction of your bentonite needs, you can rely on Magcobar for superior products and service in virtually unlimited supply. For molding or core sands; for ferrous or non-ferrous metals; for your methods of operation, there's a Magcobar bentonite for your specifications!

You can standardize with Magcobar bentonites, too, because Magcobar has the world's largest reserves of high-quality, uniform raw materials. These proved reserves—plus Magcobar's rigid quality-control processing — are your assurance of consistent bonding agents, bag after bag, carload after carload.

For full technical information and prices, call, write or wire the man from Magcobar.

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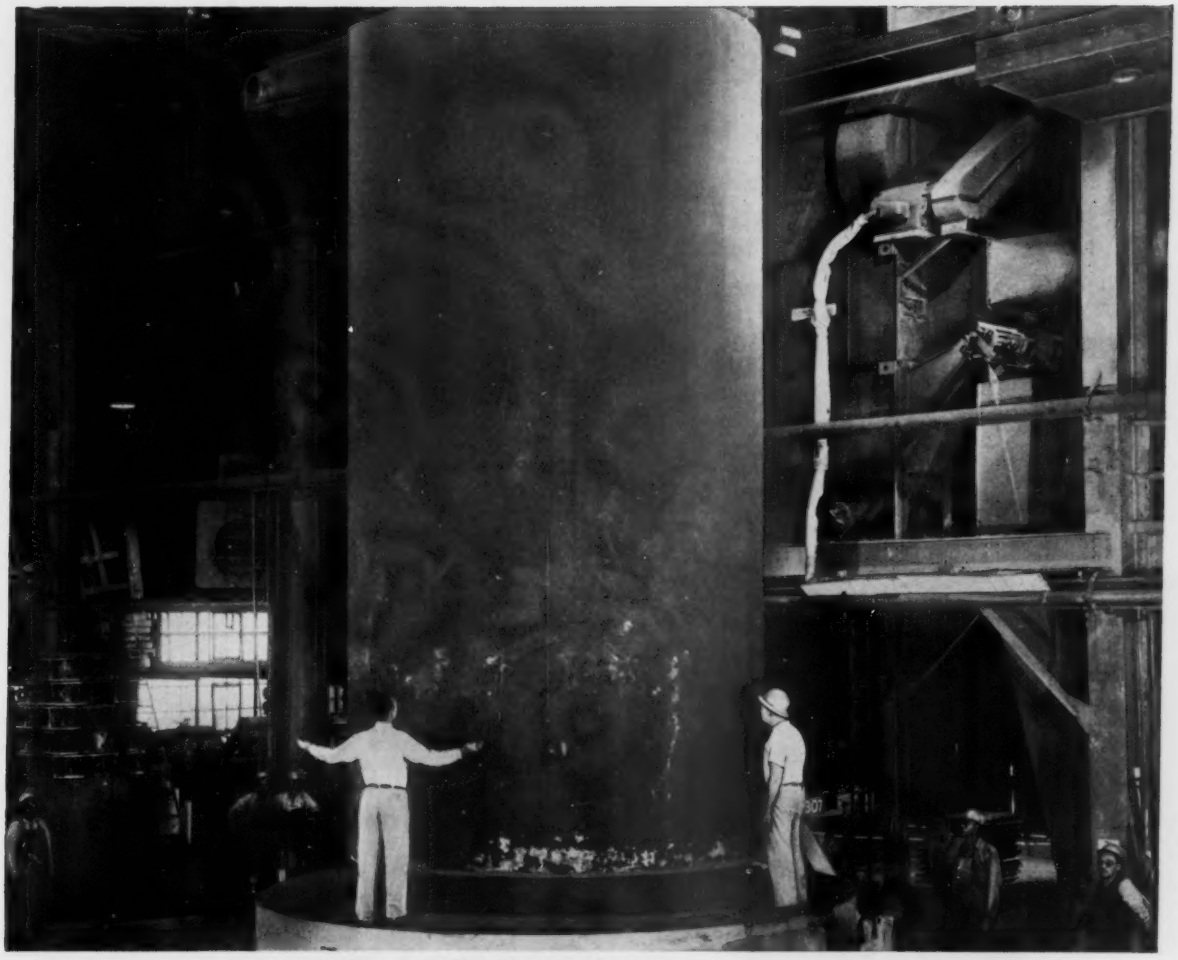

40-Ton Dryer Roll being removed from the mold at Newport News Shipbuilding and Dry Dock Company, Newport News, Virginia.

How nickel cast iron helps take the risk out of large castings

Here's a Yankee dryer roll for example. It weighs 40 tons. Length: 262 inches. Diameter: 12 feet.

It's just too big to take a chance. The foundry can't afford a reject. Especially when a reliable metal can assure pressure tightness... ample strength... a smooth surface... and easy machining.

Nickel cast iron assures a sound casting through uniform metal structure

Nickel irons combine fine graphite in a uniform matrix. They promote strength and rigidity, and a surface free of imperfections.

Because of these properties Newport News specifies a nickel cast iron for these rolls. Even with today's high steam pressure this nickel cast iron dryer roll will stay pressure tight. It's definitely not a leaker. Its surface, thanks to nickel cast iron, is uniform and smooth.

The roll easily meets the strength levels required by the boiler code. The basic 1.34% nickel iron composition achieves 40,000 minimum tensile strength every time.

And Newport News needs nickel cast iron to get the high polish, mirror-like finish required on the roll. Uniform structure and the absence of carbides and defects afford a readily machined and polished roll.

You, too, can get this dependability in heavy iron castings — or in light ones that need high strength, pressure tightness and good machinability. Nickel cast irons are quality castings. And quality castings are good business ... for you, and for your customer.

For assistance on specific composition problems, contact Inco. Our engineers will gladly provide the metallurgical information you want.

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NICKEL CAST IRONS

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Fast Table Service

Easy loading and unloading of Wheelabrator® Swing Table speeds work handling

The unequalled versatility of a Wheelabrator Swing Table is the key to important savings for scores of foundries. Many castings that are impractical to clean by any tumbling process can be cleaned on a Swing Table with remarkable ease and economy. In many cases, the costly air-blast room can be eliminated.

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The unrestricted area above the work table when the door is open permits use of mechanical loading devices for most efficient handling of any type of work. One Swing Table unit can be served by several auxiliary work tables, further reducing down-time for loading. Double-door units having a table on each door offer still greater production capacity.

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A PENTON PUBLICATION

October 1958
Volume 86—Number 10

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FOUNDRY is edited primarily for management, production, technical, and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve all key foundry personnel on a personal or routed basis. A limited number of copies is supplied at no cost to educational institutions.

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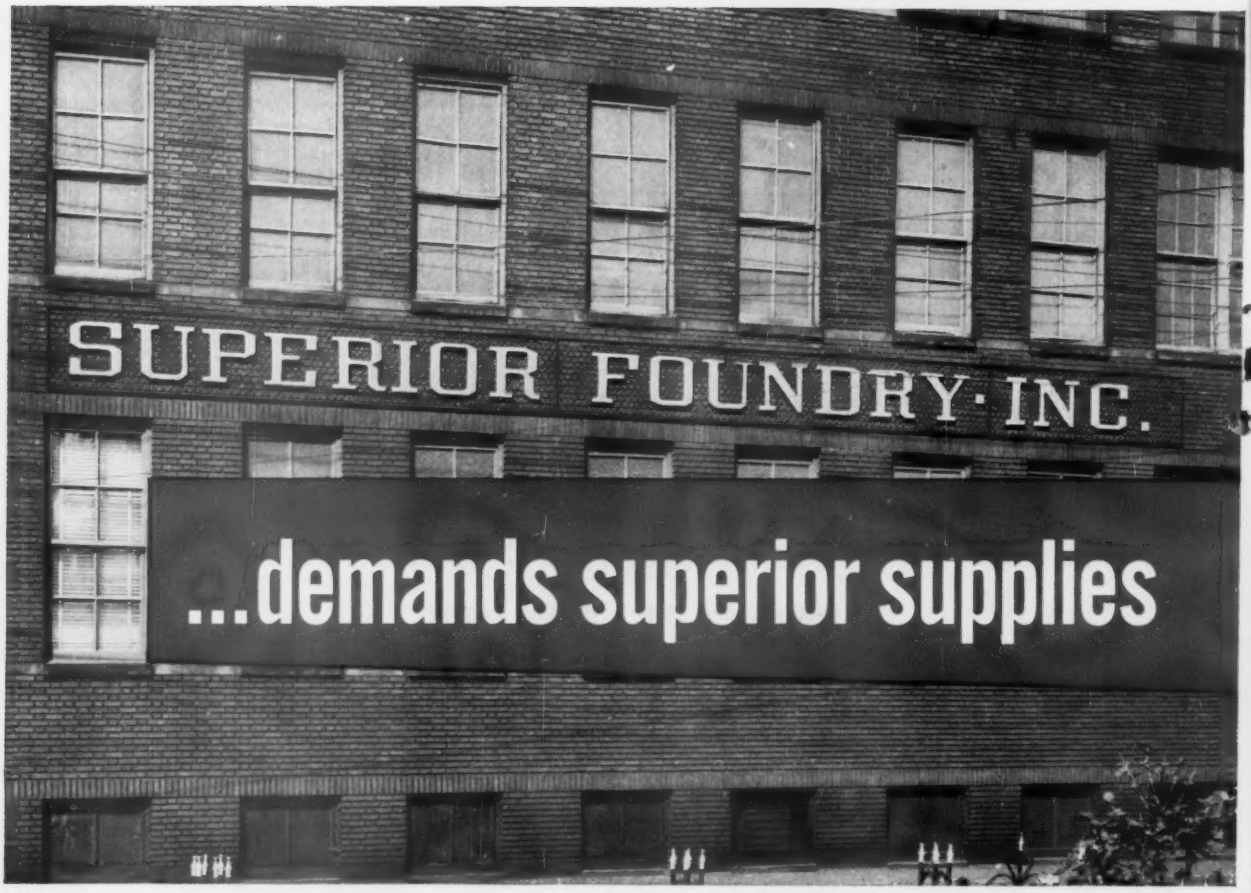
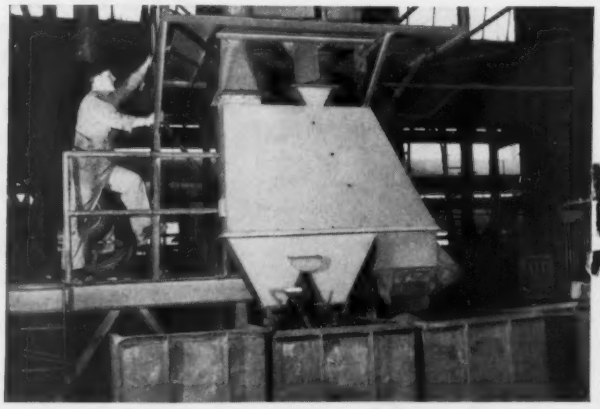


Superior Foundry, Inc., Cleveland, Ohio. Here, quality control and craftsmanship together produce consistently fine castings at lowest possible cost.

Mullers supply molding machines with seven basic facing sand mixes. CROWN HILL SEA COAL and GREEN BOND BENTONITE are introduced in varying amounts to correspond to the specific mold requirements.



Sands are reconditioned by removing fines in this sand scrubber. Reclaimed sand is reused in the facing sands. This scrubbed sand is also used with perfect results in the core room where LINOIL is employed as a binder and ADM-FEDERAL REFRACTORY CORE WASHES are used.

Archer Daniels Midland company

FEDERAL FOUNDRY SUPPLY DIVISION

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Complex castings ranging from 10 to 2200 lbs. are produced by Superior Foundry for numerous automotive, air-conditioning, and road building equipment manufacturers. Illustrated is an intricate compressor housing with critical internal dimensions and thin wall sections. It is typical of the Tiffany-like work performed by Superior Foundry, and emphasizes the need for uniform sand mixes.

for accurate control of sands

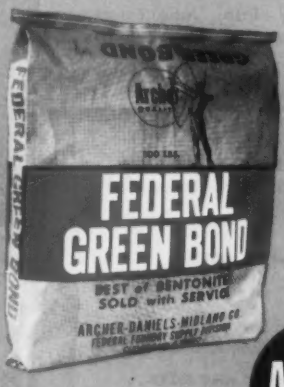
Quality is the watchword up and down the line at Superior Foundry, Inc., Cleveland, Ohio, where a system of statistical quality control supplements individual skill and ingenuity—intercepts errors and puts them in check before they can multiply. Control is centered in three primary areas: (1) Metallurgy (2) Pattern Design (3) Sand Mixture.

Accurate control of the molding sands is maintained through the use of statistics. In other words, Superior Foundry has learned to duplicate successful sand mixes and apply them scientifically on repeat, or similar, orders.

Important to casting quality is the uniformity of the ingredients introduced into the facing and system sands. That is why uniform ADM-FEDERAL CROWN HILL SEA COAL and GREEN BOND BENTONITE have been specified for years by Superior Foundry.

Call your ADM-FEDERAL Representative today; ask for a demonstration of CROWN HILL SEA COAL and GREEN BOND BENTONITE in *your* foundry.

CROWN HILL SEA COAL is carefully graded into six distinct grinds. It is uniformly high in volatile combustibles and extremely low in sulphur and ash content. Through rigid control of these characteristics CROWN HILL SEA COAL offers the ultimate in dependability, performance, and uniformity.



GREEN BOND BENTONITE, the purest of Western bentonites, provides the high degree of quality and consistency needed in shops like SUPERIOR where statistical quality control is employed. This material is unmatched in its natural bonding power with maximum permeability.

manufacturers of —

CROWN HILL Sea Coal	ADM-FEDERAL Core Washes	GREEN BOND Bentonite	ADM-FEDERAL Plumbagos	LINOIL Core Oils
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Circle 555 on Page 131

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are built by foundry oven experts

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Foundry ovens are our business . . . not a sideline. Coleman Dielectric Core Ovens are the product of over half a century of specialized experience in the design and construction of ovens for every foundry need.

2 AUTOMATIC CONTROL MECHANISMS

Automatic Load-Monitor controls conveyor operation . . . permits baking a greater variety of cores without constant adjustments . . . prevents shut-downs due to overloading. Automatic Grid Control adjusts power tube to varying loads. Recycle overload system automatically restores oven to operation after momentary overload, shuts down oven if unsafe condition persists.

3 COMPLETELY SAFETY ENGINEERED

All components are protected by locked doors and safety interlock system that instantly shuts off high voltage circuit when any door is opened.

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Motorized electrode, conveyor and power controls located on convenient, centralized panel. Electric meter indicates electrode height in inches.

5 FULLY ENCLOSED UNIT CONSTRUCTION

Oven, power generator and conveyor are combined into one compact unit for Greater Efficiency . . . Simplified Installation.

Coleman Dielectric Core Ovens are posting spectacular production records in Aluminum, Brass and Bronze, Gray Iron, Magnesium, Malleable and Steel Foundries.

For an unbiased opinion about the suitability of dielectric core baking for your foundry, consult a Coleman Oven Engineer. As builders of the world's only complete line of foundry ovens, we have no reason to recommend any but the best for your needs . . . we make them all.

WRITE FOR BULLETIN 657

• **Bucyrus-Erie Company, Erie, Pa., can turn out 2000-3000 pounds of phenolic resin bonded cores per hour in their Coleman Model 75CD-6019 Dielectric Core Oven. Cores range in size from one pound to over 100 lbs.**

• **This Coleman Model 60CD-4814 Dielectric Core Oven serves four high speed core blowers, each filling ten plastic multi-cavity blow-in driers per minute, at The Schaible Foundry, American-Standard Plumbing and Heating Division, Cincinnati, Ohio.**

A COMPLETE RANGE OF TYPES AND SIZES . . .

for every core baking and mold drying requirement:

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MEMBER FEMA

This 23-lb. motor frame illustrates the smoothness of castings made in G-E shell molds. It is unusual too as one of the heaviest castings in regular production by the shell molding process.

"smooth castings are more salable

...and we get consistent smoothness with G-E Shell Molding Resins," says James J. Silk, Shell Molding Sup't, Taylor & Co. Inc., Brooklyn, N.Y.

When parts must be cast to close tolerances, the foundry that uses shell molding holds a big competitive advantage.

Shell molding provides a degree of surface finish that reduces machining up to 90% — in some cases, eliminates it entirely. The little machining that may be required is easier to do on a shell molded casting, too; absence of water in the mold prevents the surface hardening or "skin effect" imparted by conventional sand molds.

Aggressive foundries like Taylor & Co. promote these advantages to increase their sales of profitable precision-cast items. And, to insure the highest degree of accuracy in the shell mold itself, knowledgeable foundry superintendents like Taylor's Jim Silk rely on G-E Shell Molding Resins.

For technical data on G-E Shell Molding Resins and Silicone Release Agents, or for answers to your shell molding problems, write General Electric Company, Chemical Materials Dep't, Section F-48, Pittsfield, Mass.

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GENERAL ELECTRIC

Circle 557 on Page 131

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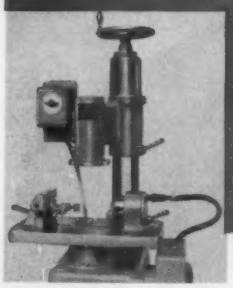
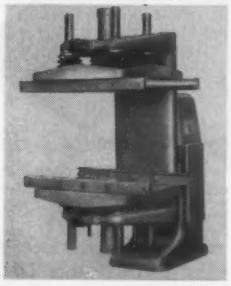
BETTER CORES IN LESS TIME — AT LOWER COSTS.



Bench Model CO2 Hardener

Floor Model CO2 Hardener



Roll Over and Draw Machine

HANSBERG SHOOTERS

are in service in all major industrial areas of the United States. They have become universally accepted as dependable, low maintenance foundry machines — offering outstanding advantages over old fashioned sand blowing equipment.

HANSBERG provides the widest range of models and sizes of all core equipment manufacturers and can fill every Foundry requirement.

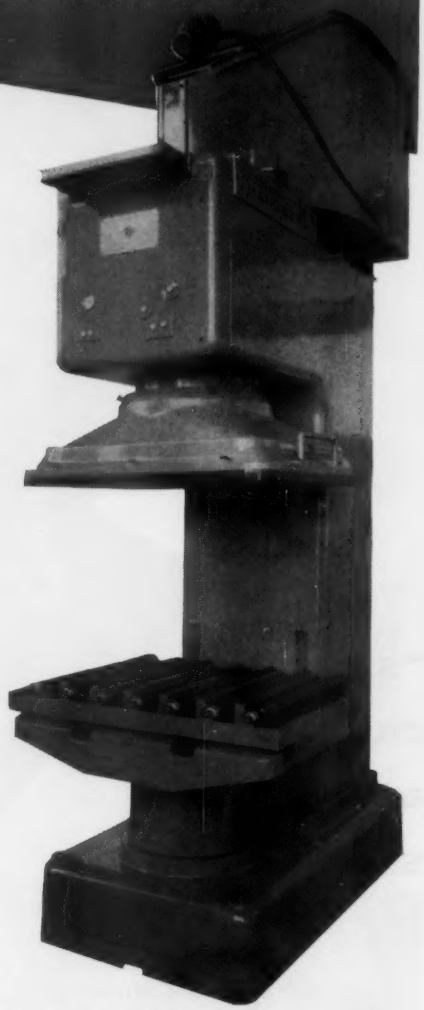
FULLY AUTOMATIC SHOOTERS (H-5-A, H-12-A, H-25-A, H-80-A) completely automatic — push button control — automatic sand charger — push-button adjusted table height hydraulically operated — no electric current required.

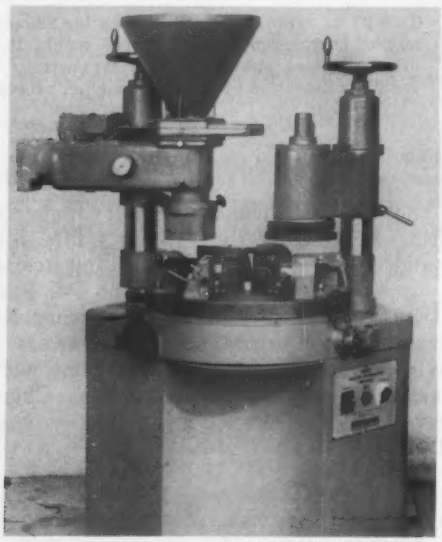
ECONOMY MODELS (H-5-R, single — twin — triple heads for long cores, H-12-R) semi-automatic — one lever control — table height adjustment by crank. BENCH MODELS (H-M, H-1-M, H-1-R, H-2.5-R) semi-automatic — one lever control — table adjustment.

FULLY AUTOMATIC ROLL-OVER AND DRAW MACHINE (W-2) fully automatic — push button control.

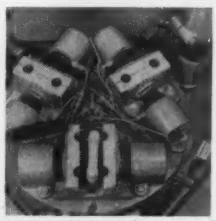
CO2-HARDENING MACHINES (K-1-A-200, K-1-A-300, K-2-A-500, K-2-A-700) fully automatic — push button control with adjustable gas timing 1 to 20 seconds.

LOW INITIAL COST because of large production prices of Hansberg Shooter equipment have been substantially reduced. Foundrymen have told us that their Hansberg Shooter represents their best investment in foundry equipment. Can't we give you the complete facts so that you can consider the advantages of SHOOTING over the out-dated method of core BLOWING. Why not write or phone us today.





THREE STATION TURN TABLE MACHINES, CORE SHOOTER AND CO2-HARDENER COMBINED. Triples production with minimum use of CO2 — no expensive pattern equipment necessary — no heat: no distortion of cores — wooden core boxes possible — available fully and semi-automatic — two sizes.



Overhead View of Turn Table

HANSBERG CORE SHOOTER

Fully automatic, push button control includes exclusive automatic sand charger, quick interchangeable shoot heads, RAPID CHANGE OF CORE BOXES, adjustable table height hydraulically operated, telescoping cylinders ground to closest tolerances are hydraulic and air operated and allow widest range of clamping and drawing of core boxes, sand reservoir stationary can not get out of line with the table as in old fashioned core blowing machines with moveable sand reservoir. No agitators as in sand blasting core blowers — heaviest sands possible.

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Circle 560 on Page 131

With the Editors

COMING UP: The editors have a number of interesting articles scheduled for publication in coming months. "Shrinkage Tests for Cast Iron," by three German authors, describes development of a shrinkage test specimen which permits good reproducibility and a comparison of results by different foundries. "Maintenance of Fluid Power Components" tells how to keep hydraulic and pneumatic units in good working order.

"Quoting for Profit" discusses the step-by-step analysis of a casting blueprint which enables a foundry to arrive at the proper selling price. "Navy Molding" gives a picture of how the Navy trains the men who operate the foundries of its repair ships. "Shell Molding Solves Casting Problem" describes production of small parts for marine equipment.

Clyde Frear's series on "Shrinkage Prevention in Bronze Castings" will be concluded next month.

—o—

Skills Also Needed: Many foundrymen have been concerned with the recent trend in engineering education toward the elimination of courses that would develop skills as a means of better understanding the function of engineering design, construction, production, or operation.

Recently, in addressing the 7th annual General Motors Conference for Engineering and Science Education, Dr. Gordon B. Carson, vice president, Ohio State University, warned against "going too far toward complete abandonment of the experimental method, as greater emphasis is placed on basic science and mathematics courses." Dr. Carson declared that "some educators have run great risk of destroying the very thing that made engineering education effective . . . in its early years in the United States."

The speaker, who, incidentally, is familiar with the foundry industry and its needs, indicated that skill is important when it is defined as ability to apply intellect to the solution of problems for the benefit of mankind. In his opinion, if our country is to survive, engineering students need development of intellect, enhancement of skill, and understanding of modern tools in the engineering curriculum.

Dr. Carson explained that tools are a fit subject for the investigation of the students in a higher education process. Within the last few years, however, many educators have deplored what they called "tool courses" or the "hardware approach." In many cases these courses have been abandoned because some educators fail to understand their importance or do not integrate them properly into the engineering curriculum.

Dr. Carson believes tool skills, which should include courses on the production of castings, are necessary. We agree thoroughly.

—o—

Research Grows: Expenditure of time and money on research continues to grow, even in times of lower business volume. A study of more than 800 companies recently completed by the American Management Association gives interesting information on the development of this phase of industrial progress. Of the 24 industries covered by the survey, 18 showed an increase in budget for research and development ranging from 2 to 26 per cent, and six showed a decline, the greatest being 15 per cent. The study also showed that expenditures for research and development in 1957 averaged 2.8 per cent of sales.

—o—

Wins Slogan Contest: In commemorating its centennial, Gardner-Denver Co., Quincy, Ill., recently conducted a slogan contest among its employees throughout the world. Winner was John H. Bent, Fullerton, Calif., employed by the company's West Coast fabricating division, with the slogan "Equipment Today for the Challenge of Tomorrow."

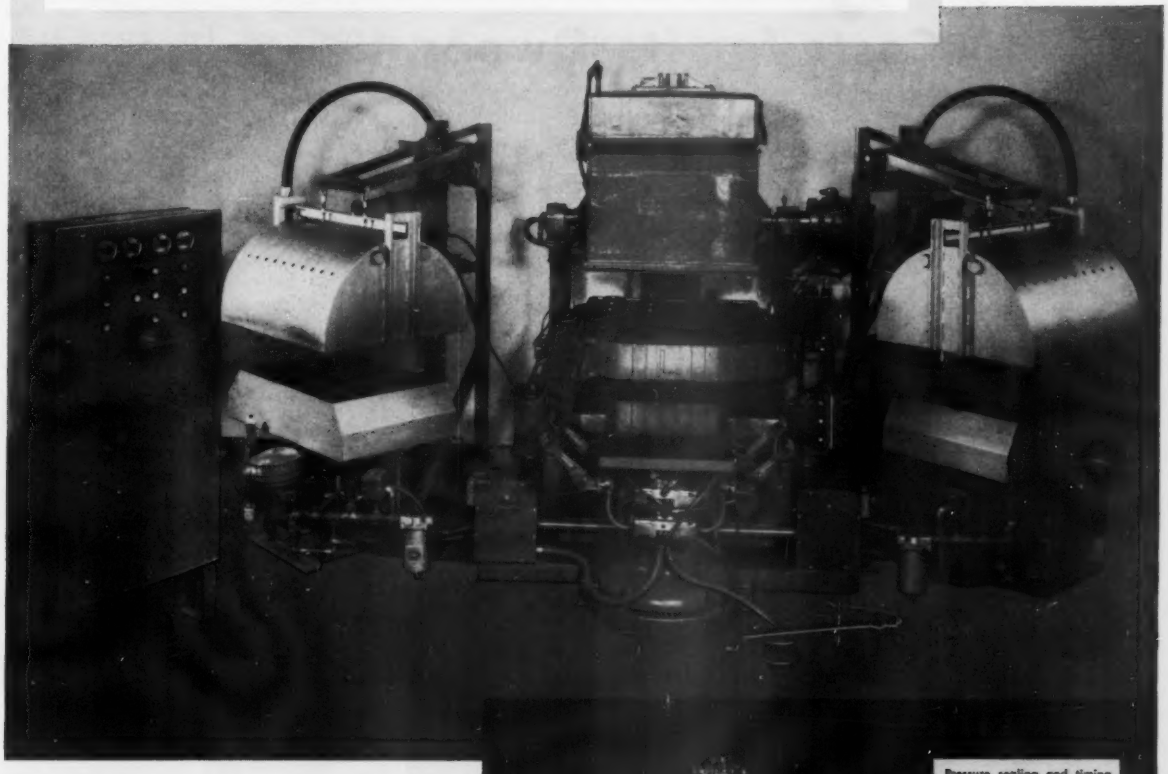
—o—

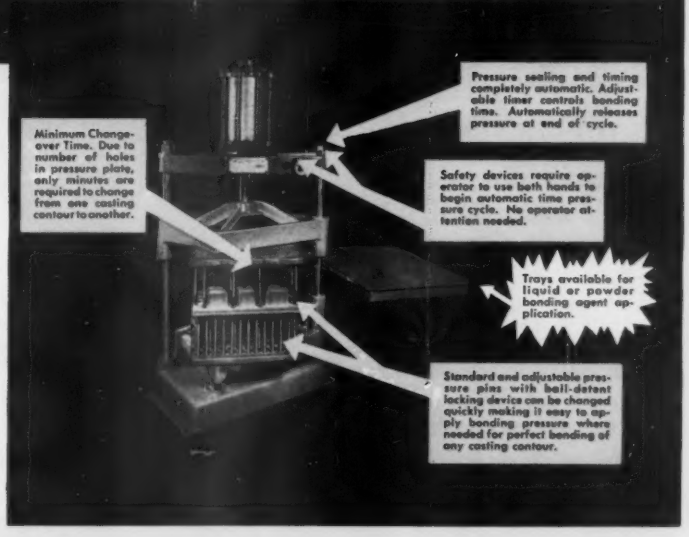
GIFS at Design Show: Gray Iron Founders' Society conducted a guessing contest each day during the 1958 Design Engineering Show in Chicago. Visitors at the GIFS booth were asked to estimate the weight of a polished crankshaft supplied by the Nordberg Mfg. Co., Milwaukee, through the courtesy of Arthur G. Hall, works manager.

The crankshaft was a class 50 acicular gray iron, 33 in. long with 3½-in. main bearings and 3-in. crank bearings. It was produced

RIGHT for your shell molding operation

The New Chicopee Twin and patented Shell Bonder




Pressure sealing and timing completely automatic. Adjustable timer controls bonding time. Automatically releases pressure at end of cycle.
Minimum Change-over Time. Due to number of holes in pressure plate, only minutes are required to change from one casting contour to another.
Safety devices require operator to use both hands to begin automatic time pressure cycle. No operator attention needed.
Trays available for liquid or powder bonding agent application.
Standard and adjustable pressure pins with ball-detent locking device can be changed quickly making it easy to apply bonding pressure where needed for perfect bonding of any casting contour.

You'll make money producing shell castings when you have the Chicopee Twin and Shell Bonder on your team. Lower initial investment, higher production, easier to operate . . . is the story in a nutshell, on these 2 great machines.

New Automatic operation, simplified controls, faster pattern preheating, larger gas burners are a few of the outstanding features found on the new Chicopee Twin.

Newly developed and patented Shell Bonder with liquid applicator assures better sealing of shell halves and completely eliminates the danger of resin drifting into shell cavities.

Write today *for literature and prices on these two great machines.*

SHELL PROCESS, INC.

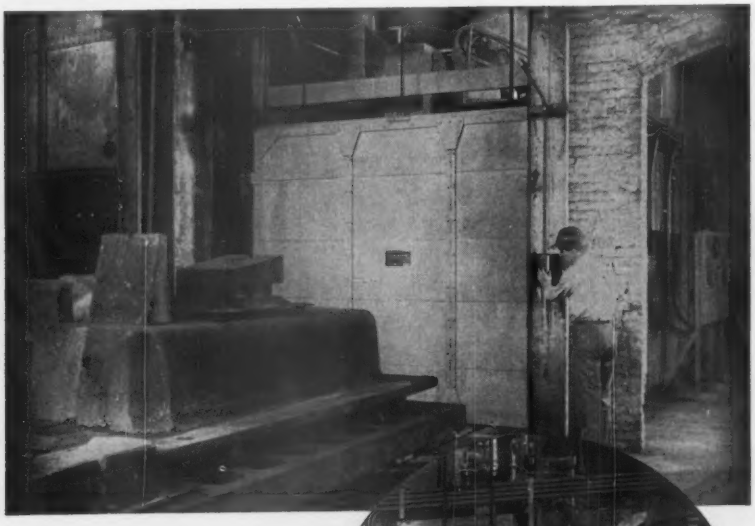
Manufacturers of Shell Molding Machines and Allied Equipment

373 BLISS STREET, WEST SPRINGFIELD, MASSACHUSETTS

Circle 561 on Page 131

here's another **carl mayer** installation...

Cutting Costs for its Owner



CAR TYPE CORE AND MOLD OVEN

Above—A difficult engineering and installation problem solved by Carl Mayer because the oven filled this space completely. This modern oven, with patented down draft heating system and motor operated lift door, replaced an obsolete brick oven.

RACK TYPE CORE OVEN

Right—Installed at rear of mold oven to form an efficient, flexible combination. Miscellaneous cores are uniformly baked with modern, automatic controls. Operation is efficient and economical.

Carl Mayer's outstanding engineering and design features sold the steel mill where these ovens are now in operation. They incorporate the exclusive Carl Mayer recirculating heating system and special triple slotted panel construction.

Heat loss is reduced up to 1/3, and fuel savings up to 50% over old conventional methods are possible. Temperature uniformity is guaranteed.

Consult Carl Mayer now for any type foundry oven or furnace, large or small, and for any purpose. Write for Bulletin 53-CM.

THE **carl mayer** CORP.

20800 CENTER RIDGE ROAD CLEVELAND 16, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

for a three-cylinder diesel engine. All bearings and most of the ends of the shafts were cored out, providing about the only proof that it was a casting.

Estimates ranged from 12½ to 962 lb, and the median guess was 122 lb. The crankshaft weighed 119 lb. Two estimates were "on the nose" and five guessed 120. Winners were: Monday, Lyle Graves, Plano, Ill., and Eugene W. Clement, Chicago; Tuesday, W. G. Winkels, Rockford, Ill.; Wednesday, K. A. Hultstrand, Milwaukee; Allan Knudsen, Milwaukee; and Leslie J. Allen, Poughkeepsie, N. Y.; Thursday, Robert G. Walker, Ft. Wayne, Ind.

—o—

AMHS Essay Contest: "Tomorrow's Solutions of Today's Problems" is the theme for the 1959 Clark Essay Contest, which ends April 3, 1959. The contest is sponsored by the Industrial Truck Division of Clark Equipment Co. and is conducted by the American Materials Handling Society. A first prize of $2000 and nine other prizes totaling $3000 will be awarded for the best papers on the subject.

Contestants should discuss one or more unsolved handling problems, either in an industry or a specific company, and propose a solution. Problems anticipated in the future and their possible solution may be discussed.

Winners will be announced and prizes awarded at the Materials Handling Institute Exposition in Cleveland next June.

—o—

We Like It: A few months ago, Bill Walkins, editor of the *ESCO Ladle*, published by the Electric Steel Foundry Co., Portland, Oreg., sent us a photograph of Harold E. Henderson, H. C. Macaulay Foundry Co., Berkeley, Calif. The photograph showed Harold in his sand laboratory in regular foundry garb and we thought it was quite good. So we used it with Harold's "Meditations of a Sandman" in the August issue.

We understand that Harold now is threatening to shoot the editor because his wife says the photo clearly reveals his "vacuous personality and indicates only too clearly the underlying depravity of character which hardly deserves to be publicized."

Sorry, Mrs. Henderson, we still think it is a good photograph. Foundry atmosphere, you know.

F.G.S.

Circle 562 on Page 131

Soffel's THERMOTOMIC HoTop Gives Full Measure Value

THERMOTOMIC HoTop is the efficient and economical "shorthead" compound for Iron and Steel Castings. It generates heat up to 4000° Fahrenheit. It gives sound shrink-free castings with savings up to 65% of the feeding metal because the height of the feeding riser can be reduced to one-half the diameter or less.

This reduction permits lower copes, less sand handling and ramming with saving of production time and cost.

Ask your nearest PMP Distributor for a demonstration of Soffel's THERMOTOMIC HoTop Liquidizer and samples of Soffel's Fluxes.

PMP CO.

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Malcolm G. Stevens
78 Summer St.
PHONE: MI 8-4112 · 8-4113

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Foundry Service Company
2321-2329—29th Ave., No.
PHONE: Birmingham 4-4754

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BUFFALO 12, NEW YORK
Frederic B. Stevens, Inc.
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PHONE: Kenwood 1136

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Overseas Commodities, Ltd.
750 Industrial Ave.
PHONE: Tatlow 8531

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Shanahan's Ltd.
1050 Glen Drive
PHONE: Pacific 3101

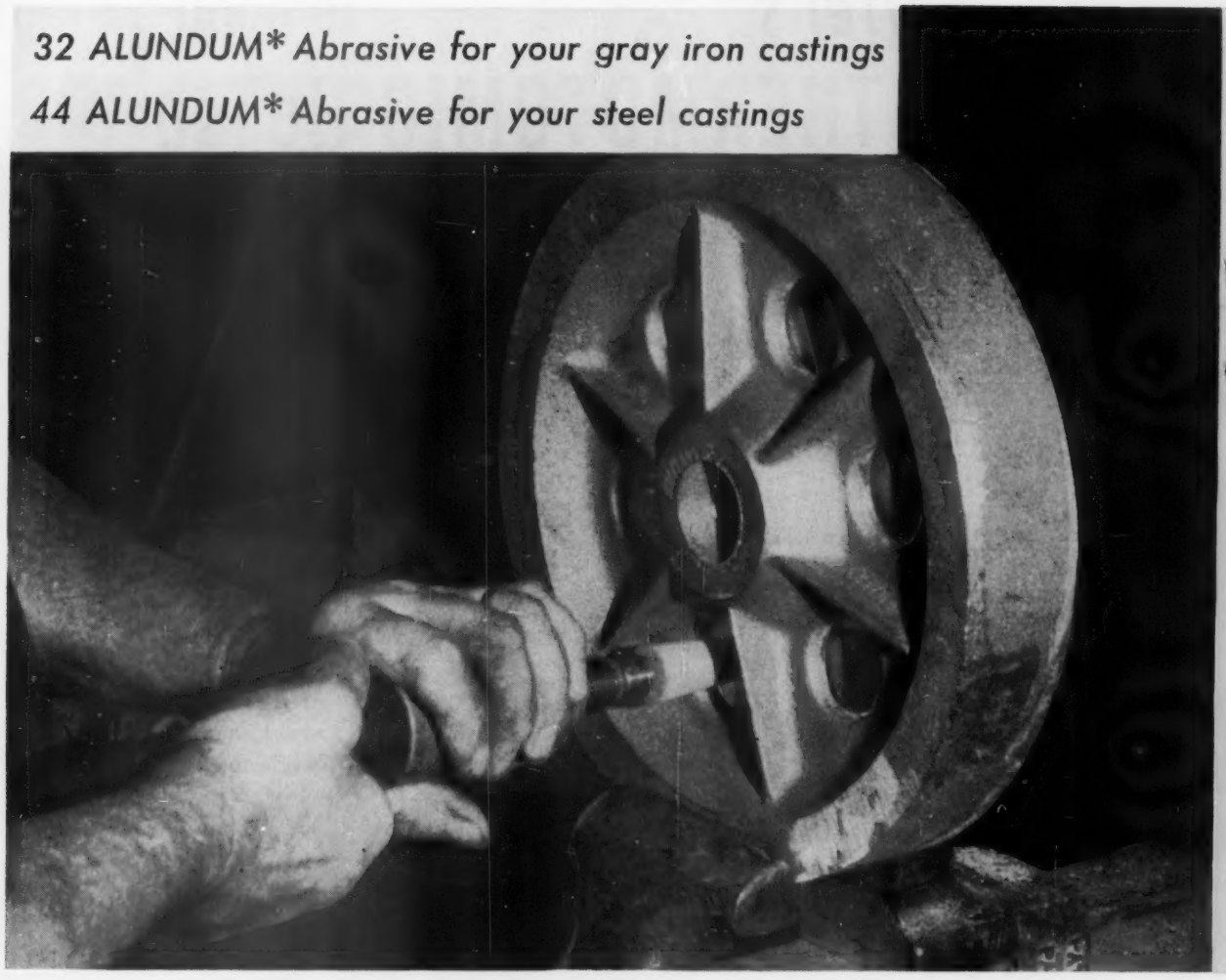
PITTSBURGH METALS PURIFYING CO., Inc.
Mars, Pennsylvania · Phone: National 5-5800

"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"

Circle 563 on Page 131

32 ALUNDUM Abrasive for your gray iron castings*

44 ALUNDUM Abrasive for your steel castings*



Here's how Norton keeps

"Making better products... to make your products better"

In snagging, as throughout their entire job range, Norton mounted wheels are hitting new highs in grinding efficiency. Outstanding new developments in abrasives and wheel construction eliminate loading and glazing — besides giving you the fastest cutting rate, with a marked increase of stock removed per wheel.

These advantages are the natural results of Norton Company's long experience in engineering mounted wheels for best performance on every application — such as tool and die finishing, metal pattern work and all kinds of rough grinding.

For steel castings, wheels of tough 44 ALUNDUM abrasive with VBE bond, and metal-mounted, are the most efficient abrasive-bond-mounting combination you can get. And they're best for weld grinding, too.

For gray iron, wheels of sharp 32 ALUNDUM abrasive with VBE bond, and metal-mounted, outperform silicon carbide wheels consistently.

Norton mounted wheels have already proved their cost-cutting, product-improving ability. "There has never been anything like them for speed and economy in our snagging," says the foreman of a leading foundry.

METAL-MOUNTING — *Another Norton Exclusive — You throw nothing away but the mandrel!*

Norton does it again! The mounted wheels are so securely anchored to the mandrel — *you use all of the abrasive!* No waste . . . all work! This radically improved method of locking the abrasive body to the mandrel is used on mounted wheels in most sizes and shapes, 5/16″ diameter and larger. Molten metal, injected into the abrasive recess at high pressure, does it — and does it fine!

Every Norton mounted wheel is accurately trued *after mounting* on rust-proof stainless steel mandrels. Developed to increase the time-and-money-saving "Touch of Gold," Norton mounted wheels are stocked in approximately 200 standard shapes and sizes. See your Norton Distributor for prompt deliveries. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

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ABRASIVES

W-1858

Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — BEHR-MANNING DIVISION Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Circle 564 on Page 131

NOW! save up to 50%

in BINDER COST with

NEW STEINEX

SLOWER-HARDENING BINDER

Specifically designed for BENCH WORK and CORE BLOWER use

CarVer FOUNDRY PRODUCTS
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Please rush information and prices on new Steinex binders.

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FOUNDRY _____

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Calendar of MEETINGS

Sept. 29-Oct. 3—Association Technique de Fonderie de Belgique, International Foundry Congress, Brussels and Liege, Belgium.

Oct. 7-8—Occupational Health and Safety Conference, sponsored by New York State Department of Labor and the Governor's Advisory Committee on Industrial Safety, Albany, N. Y.

Oct. 8-10—Gray Iron Founders' Society, annual meeting, Sheraton-Park Hotel, Washington.

Oct. 13-15—American Gas Association, annual convention, Convention Hall, Atlantic City, N. J.

Oct. 15-16—Michigan Regional Foundry Conference, University of Michigan, Ann Arbor, Mich.

Oct. 16-17—All-Canadian Foundry Conference, Royal Connaught Hotel, Hamilton, Ont.

Oct. 16-17—Magnesium Association, annual convention, Fort Shelby Hotel, Detroit.

Oct. 16-18—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18—New England Regional Foundry Conference, Massachusetts Institute of Technology, Cambridge, Mass.

Oct. 18-21—Conveyor Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 20-24—National Safety Council, National Safety Congress and Exposition, Conrad Hilton, Congress, Morrison, and LaSalle Hotels, Chicago.

Oct. 27-28—National Association of Suggestion Systems, national conference, Statler Hilton Hotel, Buffalo.

Oct. 27-30—Metallurgical Society of AIME, fall meeting, Cleveland.

Oct. 27-31—American Society for Metals, National Metals Exposition and Congress, Public Auditorium, Cleveland.

Oct. 29-31—Metal Treating Institute, annual meeting, Hotel Cleveland, Cleveland.

Oct. 30-31—Metals Casting Conference, Purdue University, Lafayette, Ind.

Oct. 31-Nov. 1 — Northwest Regional Foundry Conference, Multnomah Hotel, Portland, Oreg.

Nov. 10-12—Steel Founders' Society of America, Technical and Operating Conference, Carter Hotel, Cleveland.

Nov. 12-14—Society for Experimental Stress Analysis, annual meeting, Sheraton-Ten-Eyck Hotel, Albany, N. Y.

Nov. 11-13—Investment Casting Institute, management meeting, Roosevelt Hotel, New York.

Nov. 18-20—National Conference on Air Pollution, Sheraton-Park Hotel, Washington.

Nov. 20-21—National Foundry Association, annual meeting, Drake Hotel, Chicago.

Dec. 3-5—American Institute of Mining, Metallurgical, & Petroleum Engineers, Electric Furnace Steel Conference, Detroit.

1959

Feb. 12-13—Wisconsin Regional Foundry Conference, Schroeder Hotel, Milwaukee.

Feb. 19-20—Southeastern Regional Foundry Conference, Hotel Tutwiler, Birmingham.

March 11-12—Foundry Educational Foundation, annual College-Industry Conference, Statler Hilton Hotel, Cleveland.

March 13-14—California Regional Foundry Conference, Huntington Hotel, Pasadena, Calif.

March 16-17—Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago.

March 16-20—American Society for Metals, plus other technical groups, Western Metal Exposition and Congress, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles.

April 13-17—AFS Castings Congress & Engineered Castings Show, Hotels Sherman and Morrison, Chicago.

May 25-26—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

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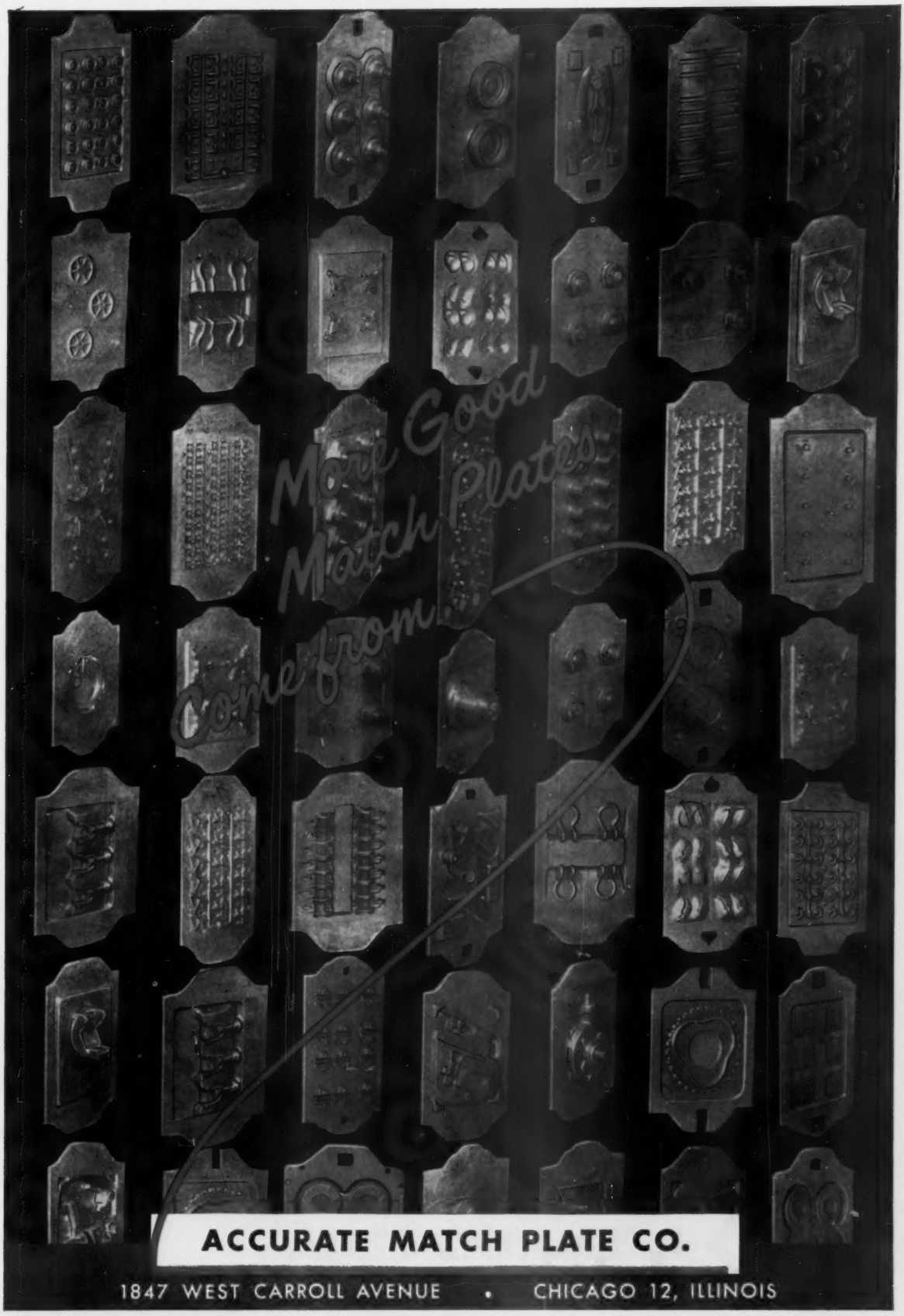


Circle 566 on Page 131

B.F.Goodrich

This B.F.Goodrich belt lasts 8 times longer, cuts costs $3,500

B. F. Goodrich improvements in rubber brought extra savings

Problem: The sand on that conveyor belt is hot enough to bake bread—375 degrees according to the thermometer in the man's hand. It's shaken from red hot castings, dumped on the belt and carried away to be reused. But the scorching hot sand baked belts hard, made them crack and break. Belts needed constant repairs, had to be replaced every three months.

What was done: When a B.F.Goodrich salesman heard of the problem, he suggested a new belt called Solarflex, specially designed by B.F.Goodrich to handle hot materials. This belt is made of a special rubber that stays soft and pliable at temperatures that cause other belts to harden, crack, and finally break down. Instead of ordinary fabric, B.F.Goodrich used *glass* fabric (optional) to make a belt that can stand extreme temperatures.

Savings: The B.F.Goodrich Solarflex belt has now given 2 years of trouble-free service—8 times that of previous belts—and still shows no sign of wear. The foundry's maintenance supervisor estimates it has already saved $3,500 in replacement belts alone, and he expects at least two more years' use from the B.F.Goodrich Solarflex belt.

Where to buy: Your B.F.Goodrich distributor has the exact specifications on the belt that solved the problem in this foundry. And as a factory-trained specialist in rubber products, he *can* answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Department M-454, Akron 18, Ohio.*

B.F.Goodrich *industrial products*

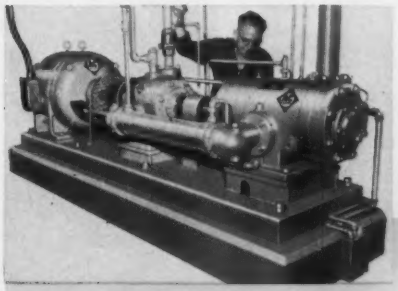
Unmatched Quality Control

with *Foundromatic* dielectric sand core ovens

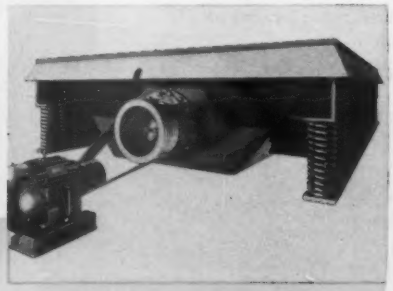
AN adjustable electrode control on these Allis-Chalmers units permits correct compensation for physical variance in cores. Burning and incomplete baking are eliminated even when cores have very thick or very thin sections. In addition, *Foundromatic* dielectric sand core ovens offer these advantages over conventional methods.

- Shorter curing time
- Less core handling
- Smoother casting finishes
- Easier shakeout
- Lower fuel costs
- Easier foundry "housekeeping"
- Fewer rejects
- Improved work flow
- Reduced cleaning time
- Simpler mixing

All the details are explained in Bulletin 15B7306D. Ask your A-C man for a copy, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.



***Ro-Flo* compressors for foundry air.** Sliding-vane design eliminates major causes of compressor trouble, maintains constant efficiency. No need for heavy foundations. Bulletin 16B8244 (two-stage) and 16B8126 (single-stage).



***Foundromatic* shakeout.** For fast knockout of heaviest castings and flasks. Rated capacity of *Foundromatic* shakeout is over twice its weight. Simple two-bearing mechanism. Bulletin 07B6365B gives all the details.

Plan to stay ahead... MODERNIZE!

Foundromatic and *Ro-Flo* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

A-5741

Circle 568 on Page 131

Is direct labor a high percentage of production cost?
Would an increased production rate lower cost?
Is machine "idle time" for part loading and unloading high?
Does operator fatigue influence product quality?

IF YOU ANSWER "YES" TO ONE OF THESE FOUR QUESTIONS BELLOWS SPOT-A-MATION WILL PAY OFF QUICKLY

● What is SPOT-A-MATION? It's applying automation principles to separate manufacturing operations by the use of Bellows "Controlled-Air-Power" Work Units.

These pneumatic powered devices can be quickly installed on standard machines to make them fully automatic; they can be used to combine or couple an operation with a preceding or following one; they can form the key units in low cost, toolroom-built, special purpose machines . . . they can be used to automate a single machine, or an entire department . . . and, nine times out of ten, will pay for themselves in the first few weeks of operation.

Free!

SPOT-A-MATION PORTFOLIO

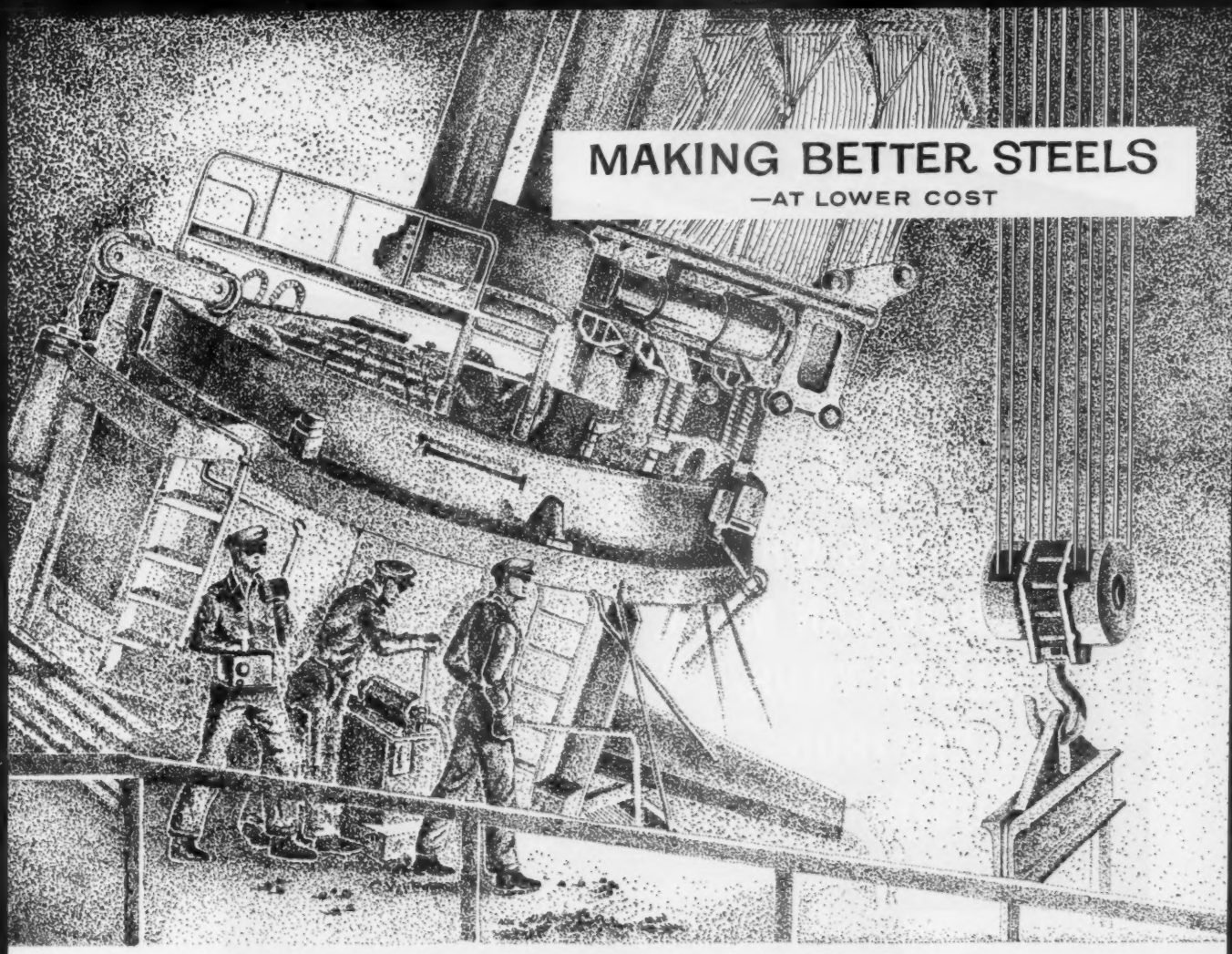
Schematic layouts, wiring diagrams, photos showing simple ways to automate standard machines. Free on request. Write Dept. FO-1058, The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto 18.

The Bellows Co.

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION

AKRON 9, OHIO

1195-B



TAPPING

. . . a heat at just the right pouring temperature is typical of the melter's technical mastery. Another important factor in making better steels at lower cost is the revolutionary **Unitrode® nipple** which "welds" the joints of **GLC Graphite Electrode columns.**

FREE—*This illustration of one of the skills employed by the men who make the metals has been handsomely reproduced with no advertising text. We will be pleased to send you one of these reproductions with our compliments. Simply write to Dept. F-10,*

ELECTRODE GLC® DIVISION

GREAT LAKES CARBON CORPORATION

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Circle 570 on Page 131

These eight reasons are based upon product availability, selection, and service.

First, as the only producer of both Northern and Southern Irons, Republic offers you the only complete line of all grades of merchant pig iron available in the industry. Northern grades include Malleable, Bessemer, Foundry, and Basic—plus Chateaugay, Republic's exclusive Low Phosphorus Pig Iron. Southern furnaces produce Foundry and Basic Irons.

Then, to assist you in selection, application, processing, and use, Republic provides expert metallurgical service. The Republic Pig Iron Metallurgists are both foundrymen and skilled technicians. They have a solid industry background gained from years of actual foundry experience. They know all types of irons and their characteristics. And, they talk a language you can understand—your language.

Republic Pig Iron Metallurgists have at their fingertips information on the latest processes and techniques available for improving castings, and expanding their use and sale.

Frequently, these men are called upon to make routine foundry surveys. Their recommendations and suggestions often result in improved operations, increased production efficiency, and output at lower unit cost. Even a seemingly minor change in operation or procedure has resulted in recapturing business lost to other methods of fabrication.

And, because Republic produces industry's most complete line of merchant pig iron, the metallurgists are able to recommend the proper grade for your specific job without hesitation or prejudice.

Seven grades of pig iron, plus prompt, expert metallurgical service add up to eight good reasons for relying upon Republic for all of your requirements. Mail the coupon for more information on Republic's complete line of irons, or for metallurgical service.

THIS STEEL "HOT" BOX MEETS ALL REQUIREMENTS for handling hot work in foundries. It is made of Republic High Strength Steel and is designed to withstand plenty of use and abuse. The box is 53″ long x 38″ wide x 26″ deep. Corrugated-steel construction of the sides and bottom assures long service life at lowest per-year-cost. Stacking brackets are securely welded to the top corners of each box permitting tiering to any practical height. 16-inch clearance is provided for easy handling by fork lift truck. Send coupon for catalog on the complete line of Republic Materials Handling Equipment.

REPUBLIC STEEL LOCKERS MEET ALL REQUIREMENTS for on-the-job protection of employee valuables and personal belongings. They provide full inside-locker roominess, sanitation, safety. Republic Steel Lockers combine smart styling and design with simple construction for fast, easy installation. The BONDERIZED finish is locked on . . . rust is locked out. Maintenance costs are held to an absolute minimum. Available in many types and sizes for every industrial plant. Republic's Berger Division offers complete planning and installation service. Send coupon today for more information.

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Send more information on:
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☐ Materials Handling Equipment ☐ Lockers

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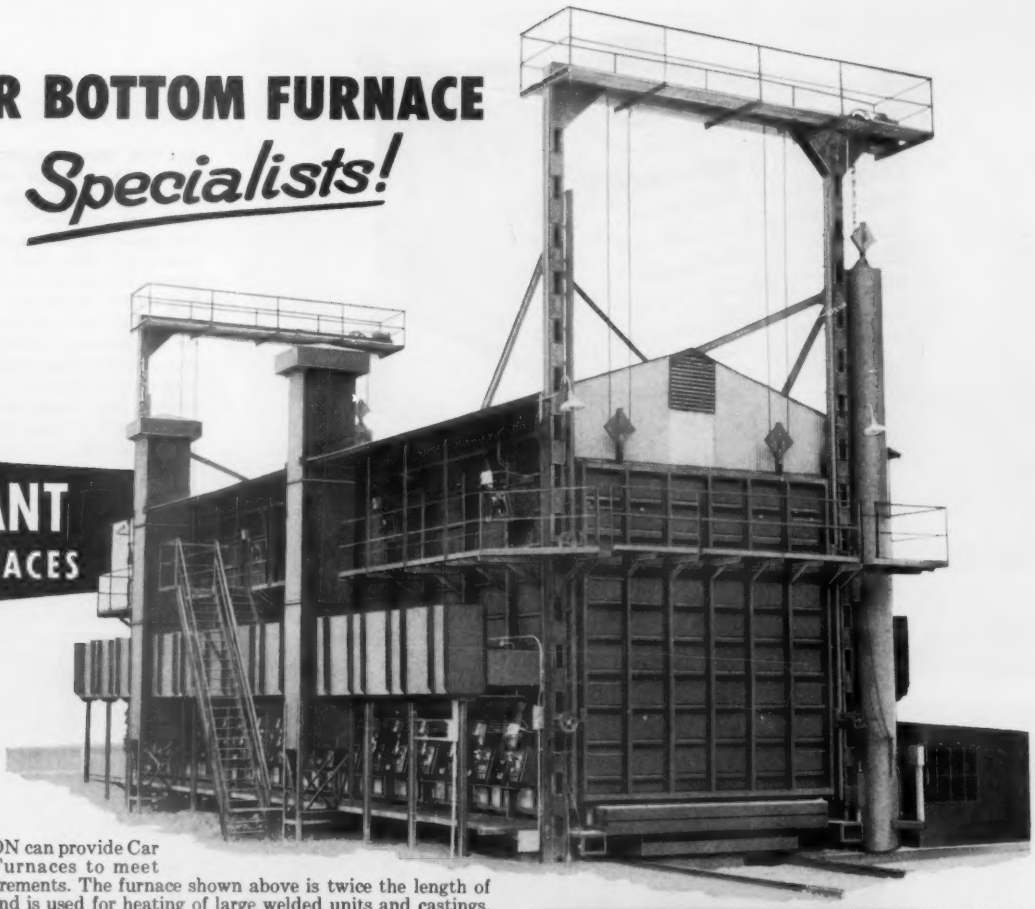
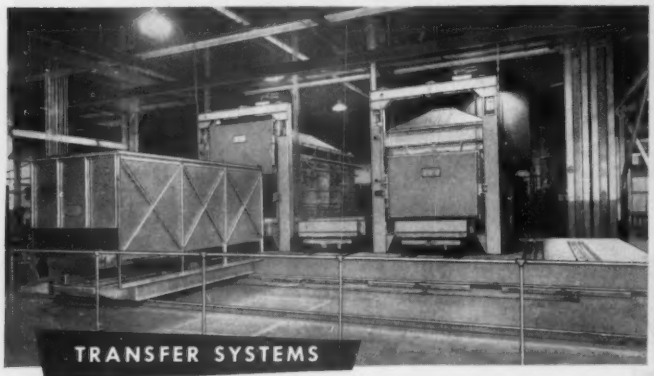
Company_____
Address_____
City_____ Zone____ State_____

Circle 571 on Page 131

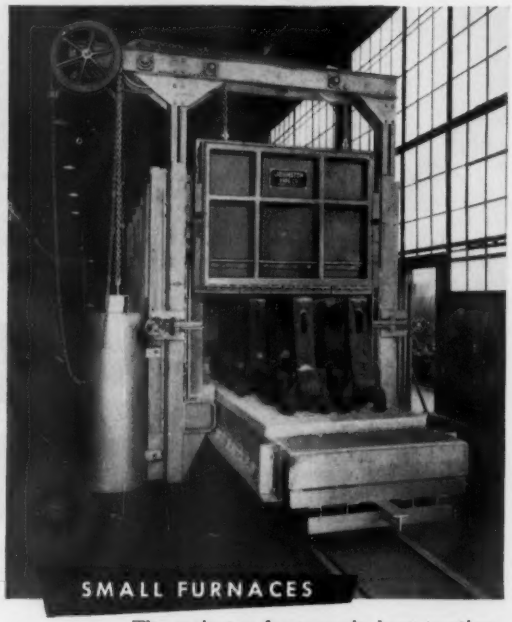
CAR BOTTOM FURNACE *Specialists!*



JOHNSTON can provide Car Bottom Furnaces to meet most requirements. The furnace shown above is twice the length of a boxcar and is used for heating of large welded units and castings. They are designed for oil or gas firing in either direct or recirculating types and for single or double end operation.



Designed for use where maximum production is demanded. Transfer systems are available with remote controls for complete operation from one point, complete with insulated transfer cars and hooded cooling stations.



The mainstay for years in heat treating departments. Available with complete program control, electric fluid drive car puller and door hoist mechanisms to provide for maximum in trouble free operation. All JOHNSTON car type furnaces have the proven mechanical seal between car and furnace.

WRITE FOR BULLETIN F240 ON JOHNSTON CAR BOTTOM FURNACES

THE JOHNSTON LINE — SAFETY — DEPENDABILITY

JOHNSTON MANUFACTURING CO.
2825 EAST HENNEPIN AVE.
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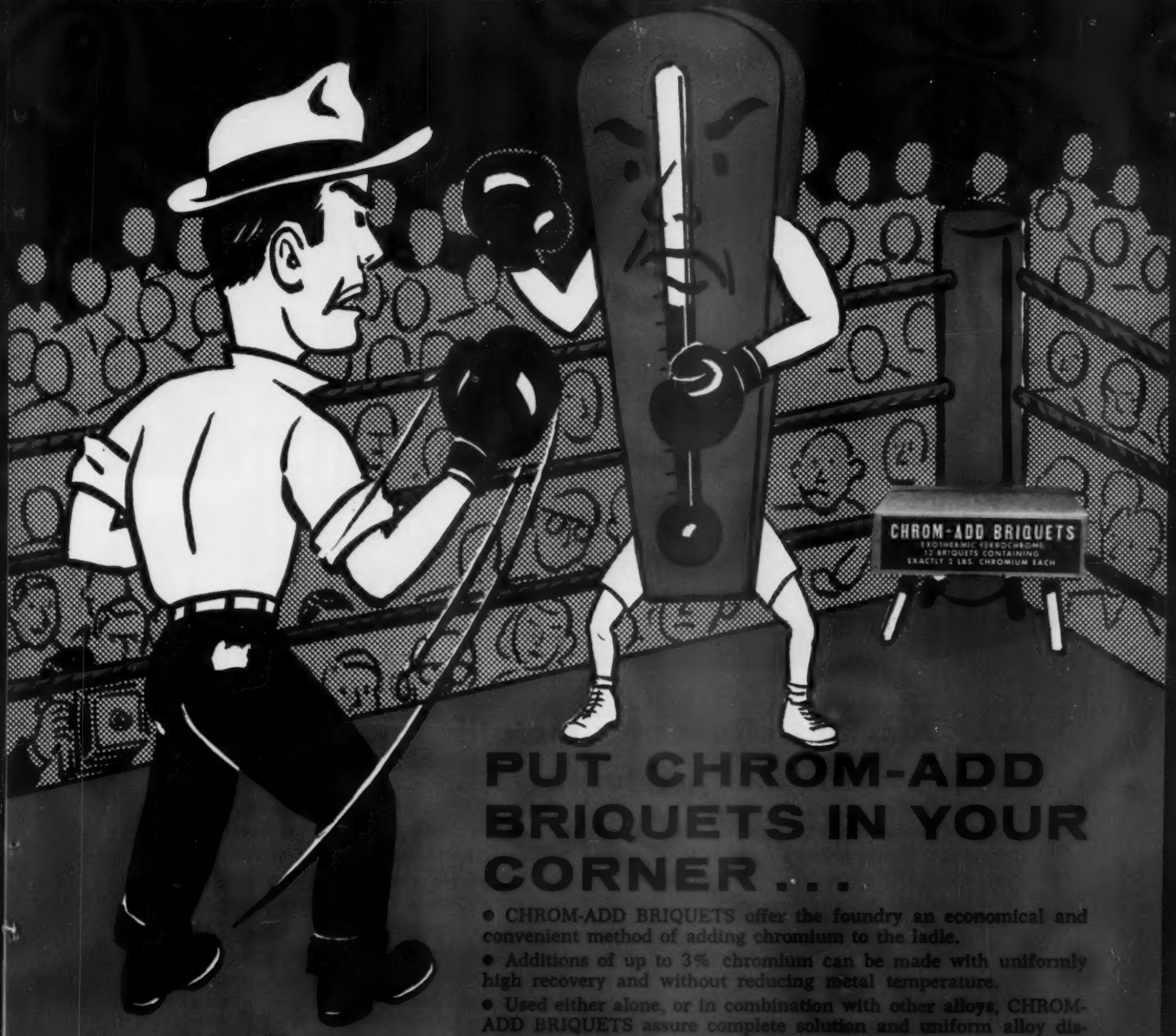
Engineers and Manufacturers of Industrial Heating Equipment

MELTING FURNACES • HEAT TREATING FURNACES • HEATING TORCHES • LADLE HEATERS • GAS & OIL BURNERS • BLOWERS

Circle 572 on Page 131

Circle 573 on Page 131→

ARE YOU FIGHTING TEMPERATURE?



PUT CHROM-ADD BRIQUETS IN YOUR CORNER . . .

- CHROM-ADD BRIQUETS offer the foundry an economical and convenient method of adding chromium to the ladle.
- Additions of up to 3% chromium can be made with uniformly high recovery and without reducing metal temperature.
- Used either alone, or in combination with other alloys, CHROM-ADD BRIQUETS assure complete solution and uniform alloy distribution in the ladle.
- Ladle additions can be made by count. Each CHROM-ADD BRIQUET weighs approximately 4.3 lbs. and contains exactly 2 lbs. of chromium. CHROM-ADD BRIQUETS are packed 12 to a carton, each briquet in its own container.

QUALITY · DEPENDABILITY · SERVICE

Ohio Ferro-Alloys Corporation
Canton, Ohio

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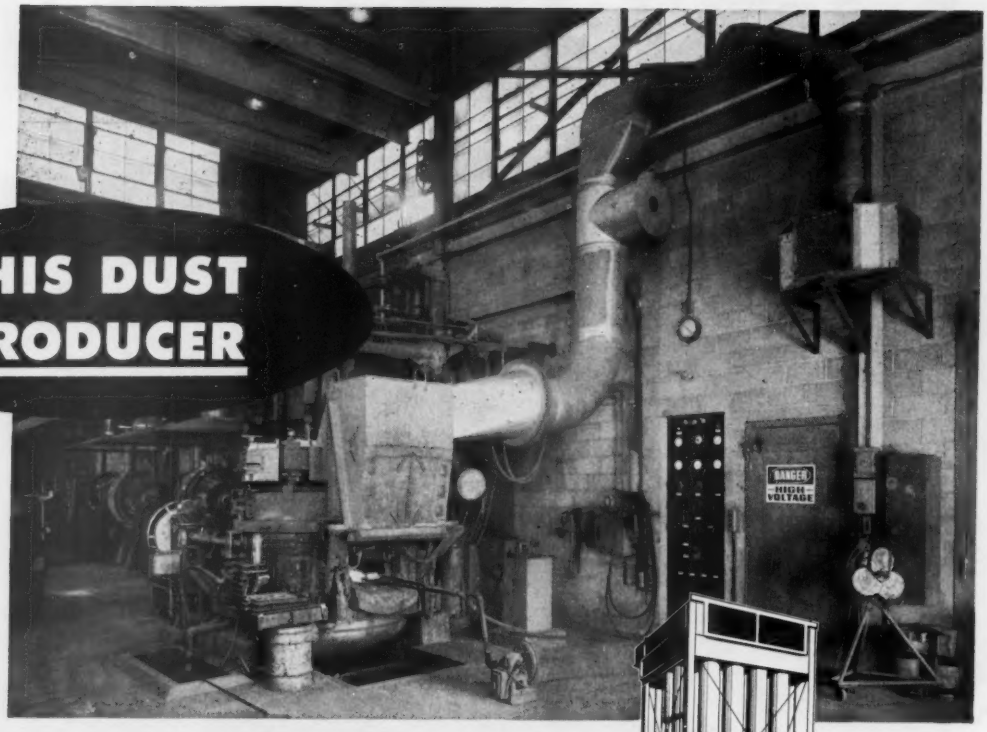
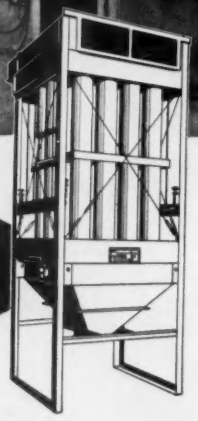
Pittsburgh • San Francisco • Seattle
Denver • Kansas City • Minneapolis



THIS DUST PRODUCER

meets its master in THIS DUST COLLECTOR



AAF AMERjet eliminates metallic fumes from electric melting furnaces

A haze of smoke, dust and fumes need not accompany your electric melting furnace operation. Not when AAF's amazing AMERjet will efficiently and automatically eliminate visible traces of all three!

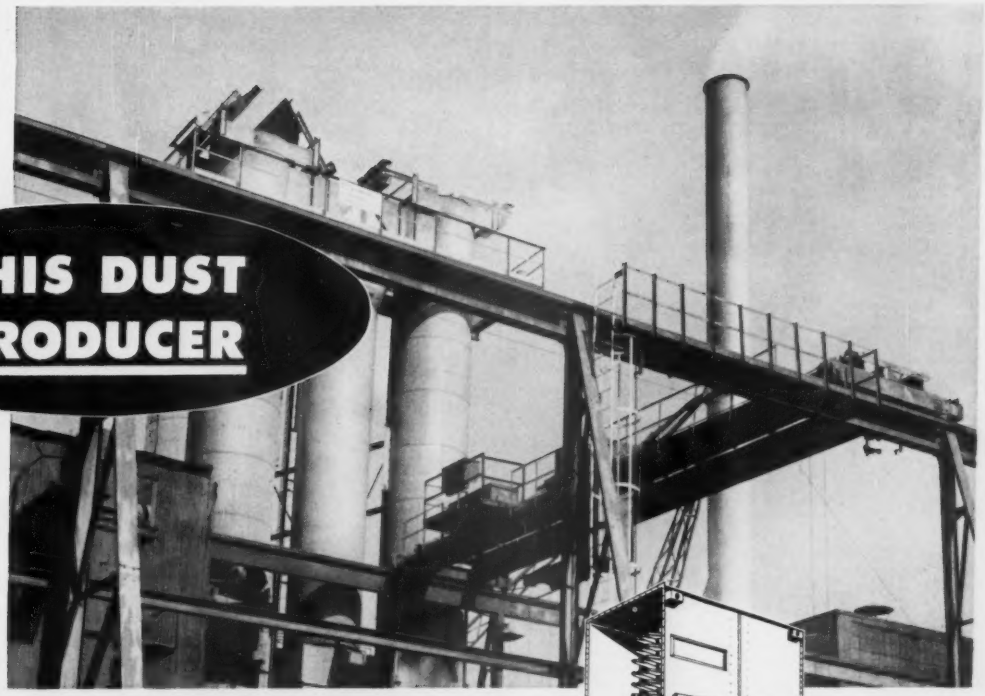
This rugged fabric arrester continuously (and automatically!) conditions its own media with a reverse jet of high pressure air. This permits velocities through the cleaning tube up to *five times higher* than is possible with ordinary fabric collectors. In addition, AMERjet offers these big plus values: (1) occupies ½ the space of conventional collectors, (2) reduces installation cost by 50%, (3) lowers maintenance costs by 45%.

For complete product information on the AAF AMERjet fabric dust arrester, call your local American Air Filter representative or write direct for Bulletin 279.

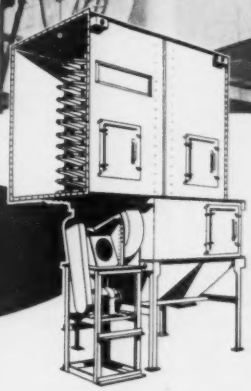
AAF American Air Filter
COMPANY, INC.
266 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P.Q.

AAF FURNACE HOOD

The AAF Furnace Hood, introduced in 1937, made electric melting furnace fume collection practical for the first time by confining the fumes for collection. The hood, *now being used by one steel foundry out of every three,* is described in Bulletin 278.



THIS DUST PRODUCER



meets its master in THIS DUST COLLECTOR

Arrange now to see an on-the-job demonstration of AAF AMERclone system controlling cupola dust

Ninety-seven foundrymen observed this AAF AMERclone system controlling troublesome cupola dust at a big mid-western foundry. They saw these AMERclone advantages demonstrated in actual practice:

1. AMERclone *gets* the dust particles that cinder catchers *miss*—the *small* particles that create *big* problems.

2. One AMERclone handles two cupolas—permits full-time use of equipment.

3. Dust and cinders are collected dry . . . disposal is simplified and corrosion of collection system is eliminated.

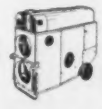
•

There's an AAF AMERclone cupola installation near you. For an on-the-job demonstration, call your local AAF representative, or write direct to John Kane, Manager, Dust Control Division, American Air Filter Company, Inc., 266 Central Avenue, Louisville, Kentucky.

AAF herman nelson

American Air Filter
COMPANY, INC.

266 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal 9, P. Q.



Herman Nelson Portable Heaters

Illinois Heating Specialties

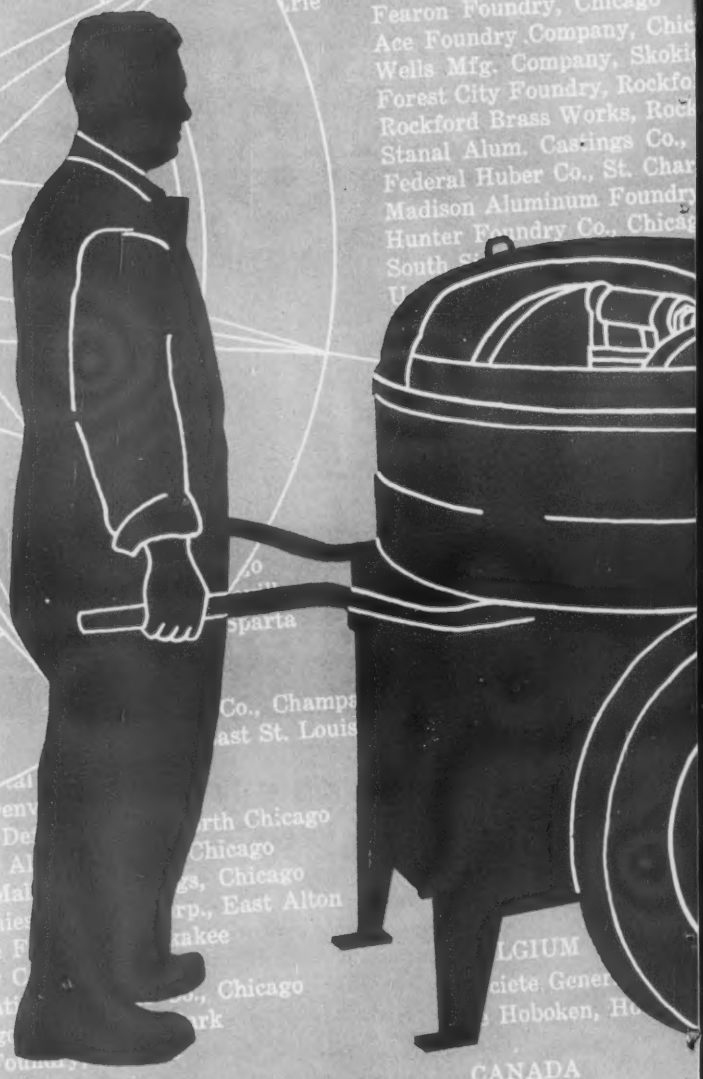
BETTER AIR IS OUR BUSINESS

AAF Electric Furnace Hoods

AAF Type K Exhauster

Circle 575 on Page 131

Foundries Everywhere



ILLINOIS
Hamilton Castings Corp., Ed
John Deere Planter Works, M
Stemac, Inc., Chicago
Bronze, Inc., Chicago
Acme Bronze, Maple Park
Fearon Foundry, Chicago
Ace Foundry Company, Chic
Wells Mfg. Company, Skoki
Forest City Foundry, Rockfo
Rockford Brass Works, Roc
Stanal Alum. Castings Co.,
Federal Huber Co., St. Char
Madison Aluminum Foundry
Hunter Foundry Co., Chica

Co., Decatur
ision, GMC, Danville
ago
Marengo
dry, Chicago
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Erie
Sparta
Co., Champ
ast St. Louis
rth Chicago
Chicago
gs, Chicago
rp., East Alton
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o., Chicago
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Foundry, Fi
Valve
B
oundry Service

RIZONA
Douglas Foundry Co., Douglas

CALIFORNIA
Allied Castings Co., Los Angeles
General Metals Corp., San Francisco
Bell Foundry, South Gate
Air Research Mfg. Co., Los Angeles
Cla-Val Company, Alhambra
North American Aviation, Inc., El Segundo
Thompson Products, Inc., Bell
Hollywood Alloy Castings Co., Hollywood
Sterling Foundry, Los Angeles
Mare Island Naval Shipyard, Vallejo
U. S. Naval Station, San Diego
Repcal Brass Foundry, Los Angeles
Victor Equipment Co., Los Angeles
Mechanical Foundries Div., Los Angeles
University of California, Berkeley
McCulloch Motors Corp., Los Angeles
South Gate Aluminum & Mfg. Co., Oxnard
Allis-Chalmers Mfg. Co., Oxnard
Corps of Engineers, Oakland
Riverside Foundry, Riverside
Douglas Aircraft, Santa Monica
Brea Alloy Mfg. Co., Brea
Titan Metal Mfg. Co., Bellefonte, Calif.

PENNSYLVANIA
J. A. Zurn Mfg. Co., Erie
Goyne Steam Pump Co., Ashland
American Chain & Cable Co., Reading
Dodge Steel Company, Philadelphia
Union Mfg. Co., Boyertown, Pa.
Continental Foundry & Machine Co., Coraopolis
Welsbach Corporation, Philadelphia
General Machine, Emmaus
U. S. Steel Co., Johnstown
Corning Glass Works, Charleroi
Pennsylvania Electric Steel Castings, Hamburg
Bridgesburg Foundry Company, Fullerton
Bronze Die Casting Co., Pittsburgh
Bushings, Inc., Philadelphia
Westinghouse Electric Corp., Trafford
National Plumbing Fixture Corp., Ellwood City

LGIUM
ciete Gener
Hoboken, H

CANADA
Wabi Iron Works,

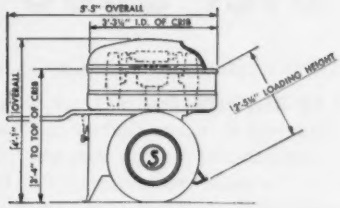
MICHIGAN
Chevrolet-Saginaw,
Accurate Foundry C
Hillsdale Foundry,
Buick Motor Divisi
Muskegon Piston R
Scott Valve Mfg. C
Buick Motor Divisi
Genessee Fdry. Pa
A.-C. Pattern Work
R. B. Carolin Fdry
Traverse City Iron
Commonwealth Br
Besser Mfg. Comp
East Jordan Iron

are wheeling SIMPSON *Porto-Muller*® into their Profit Picture

The Simpson Porto-Muller is designed around the fact that it's cheaper and easier to bring the *muller* to small or special mixing jobs, than it is to bring the sand to the muller. That's why it's making real economy possible on hundreds of jobs where makeshift mixing practices formerly took a large toll in wasted core oils and binders. Pioneers in shell, "permanent oil bond" and CO^2 processing have relied on Porto-Muller, too—for dependably uniform blending of small batches.

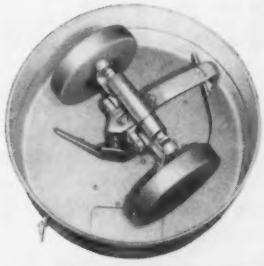
Got a job for Porto-Muller? Whether it's a big one in a small foundry or a small job in a big foundry, Porto-Muller is a superior mixer on *any* job in *any* foundry . . . and it's a true package unit. You just plug it in and start mixing! No chain hoists or special wheelbarrows are required. It's built to the same high engineering standards that has paired the name Simpson with dependably economical mixing practices for over 40 years.

Write for a specification sheet and a quotation on the low cost Porto-Muller today. Ask for a list of users that are located near you. See for yourself how foundries everywhere are translating Porto-Muller into *profit.*



A PRACTICAL MIXER "PACKAGE". *Porto-Muller incorporates operating, maintenance and construction features comparable to larger Simpson Mix-Mullers.*

AVAILABLE WITH STATIONARY BASE. *Where portability is not a factor, unit can be furnished with sturdy, heavy duty base. Can be anchored to floor or left free for semi-portability.*



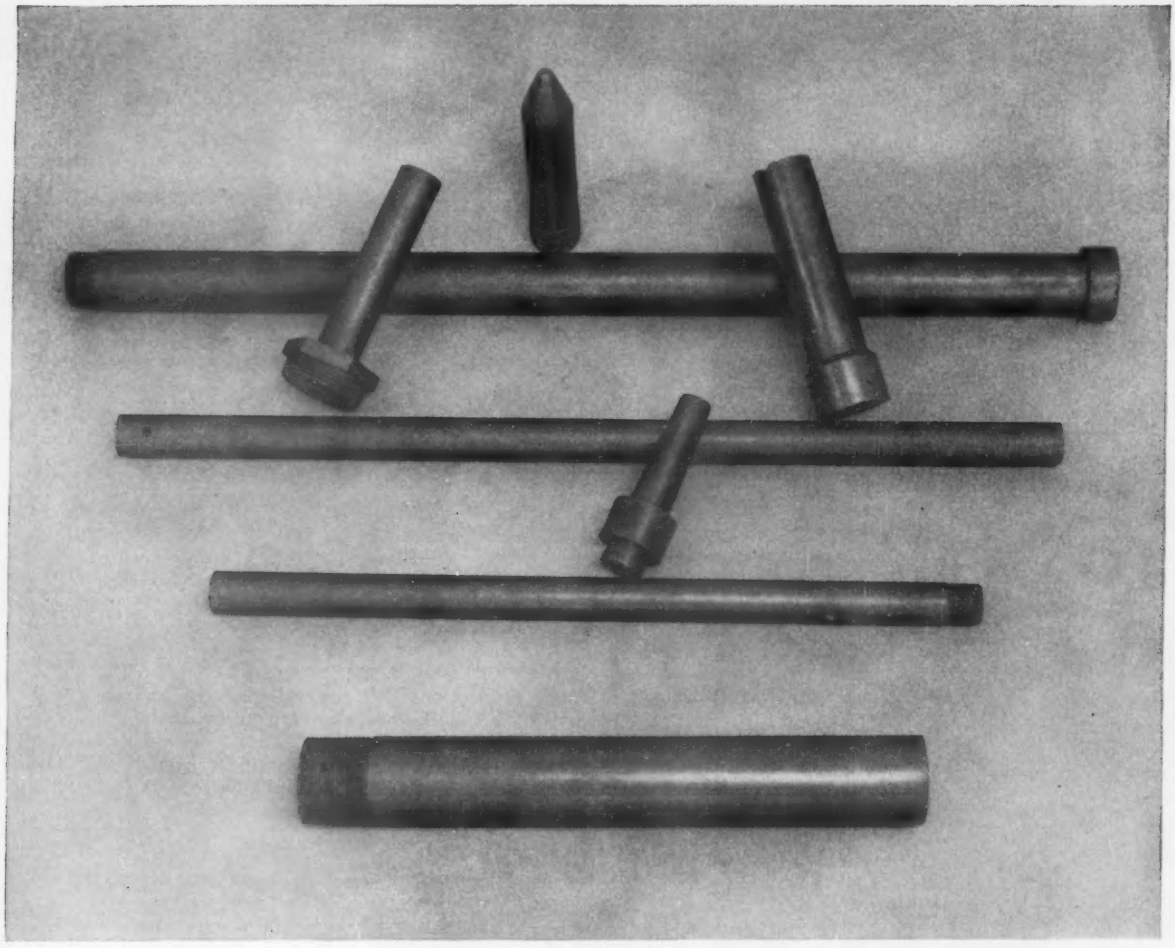
POSITIVE CONTROLLED MIXING ACTION. *Spring-loaded mullers permit easy and infinitely variable adjustment of muller pressure—permit use of light mullers, yet you can adjust to mull any sand.*

NATIONAL ENGINEERING COMPANY

646 Machinery Hall Bldg. • Chicago 6, Illinois

ANOTHER **Proven Product of a Practical Foundryman**

Circle 576 on Page 131



Intricate cylinders made of REFRAX refractory—some of which are shown here—have a wide variety of uses, including: sampling tubes, syphons, pyrometer protection, submerged heating, stoppers, pouring spouts, diffusion tubes for anode baking, pouring nozzles, riser channels, launder linings and parts for aluminizing of sheet and wire.

Close-tolerance, tubular parts that...

At 2450 F have M. R. of over 5000 psi*

What material is this that looks like a metal, can be formed into shapes formerly possible only with metals—yet has far superior properties? It's REFRAX® silicon-nitride-bonded silicon carbide: a readily-formable (tolerances of ± .005 in./in.) refractory that retains its stable properties up to, and sometimes beyond 3000 F!

WHAT ARE THESE PROPERTIES? REFRAX parts, for example, offer armor-like resistance to abrasion—either from the effects of high-velocity entrained particles or from direct, frictional contact. They're also extremely resistant to thermal shock. And they're not affected by most acids or corrosive slags . . . even *highly-reactive* materials. Shapes are made to actual size, thus avoiding grinding, threading, finishing, etc.

EXAMPLE OF BENEFITS: One customer of ours had tubes that were immersed in molten aluminum. These were made of cast iron and corroded through after only 70 hours. Contamination of the melt was "distinct." The REFRAX tubes that have replaced the cast iron have already exceeded 500 hours . . . and there's no contamination. The reason? Aluminum *can't wet* REFRAX parts; dross can't penetrate.

These and other properties of REFRAX refractory parts could mean similar savings for you. Get complete information. Write today to Refractories Div., The Carborundum Co., Perth Amboy, N. J.; Dept. C-108.

*Modulus of rupture is 5600 psi @ 2450 F.

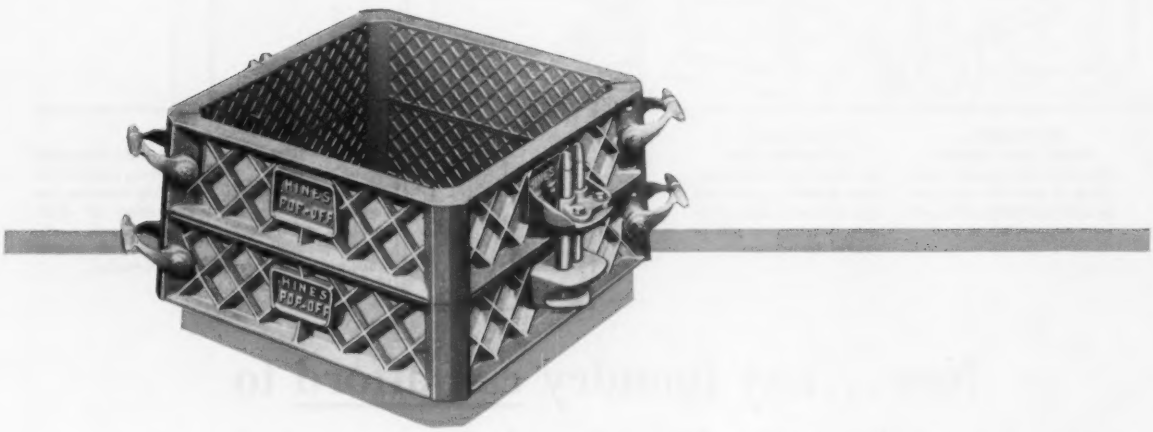
CARBORUNDUM

Registered Trade Mark

HINES STANDARD "POP-OFF" FLASKS

One of many **HINES** *developments contributing to better foundry production*

Perfect lightweight flasks for light casting work — pattern castings, test bars, hand-rammed molds, trade school work and light 10" jolt-squeeze jobs.



- HINES "POP-OFF" flasks are ruggedly built and reinforced with the familiar diagonal ribs.
- No need for hammering to remove the flask from the mold — simply move levers and off it pops!
- Serrations on inside surface of flask eliminate need for sand strips — sand is anchored so firmly there's no possibility of shift from vibration.
- Lengths and widths from 10" to 20". Depths from 7" to 12". Single or double, round, hex or "V" pins, bushings or guides — or pads for your own pins.

WRITE FOR CATALOG FOLDER NO. 204

THE HINES FLASK CO.

3431 WEST 140th STREET • CLEVELAND 11, OHIO

HINES FLASKS

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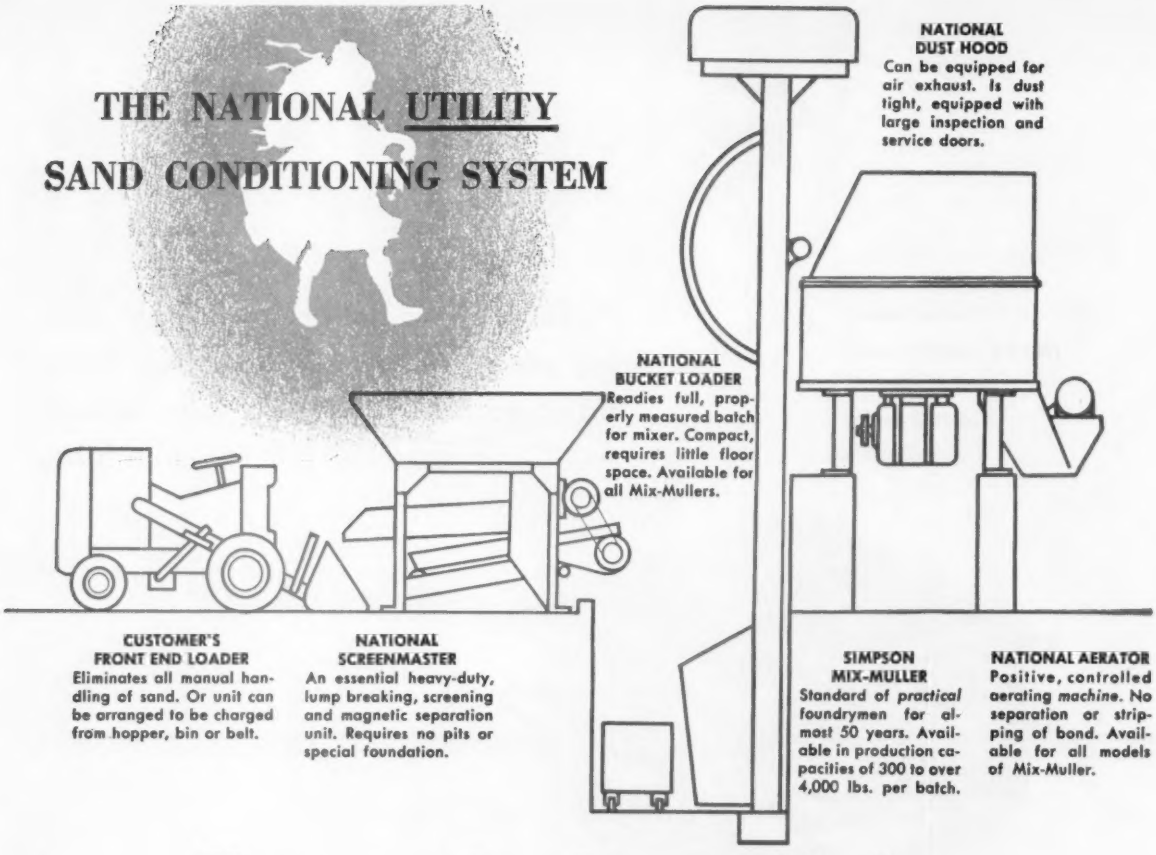
THE NATIONAL UTILITY SAND CONDITIONING SYSTEM



NATIONAL DUST HOOD
Can be equipped for air exhaust. Is dust tight, equipped with large inspection and service doors.

NATIONAL BUCKET LOADER
Readies full, properly measured batch for mixer. Compact, requires little floor space. Available for all Mix-Mullers.

CUSTOMER'S FRONT END LOADER
Eliminates all manual handling of sand. Or unit can be arranged to be charged from hopper, bin or belt.

NATIONAL SCREENMASTER
An essential heavy-duty, lump breaking, screening and magnetic separation unit. Requires no pits or special foundation.

SIMPSON MIX-MULLER
Standard of *practical* foundrymen for almost 50 years. Available in production capacities of 300 to over 4,000 lbs. per batch.

NATIONAL AERATOR
Positive, controlled aerating *machine*. No separation or stripping of bond. Available for all models of Mix-Muller.

Now...any foundry can afford to mechanize their sand preparation

The National Utility Unit is an expandable sand preparing unit designed to increase output at welcome savings in time and labor . . . *without* major expansion and physical plant change and *without* the major "all out" expenditure necessary for full mechanization.

The Utility Unit is geared to *grow* with you . . . and your profits. Its extreme flexibility makes it particularly well suited for the jobbing foundry. Its record of performance in leading foundries throughout the country since 1934 include some of the outstanding savings documented at right. The *basic* equipment components, all National-engineered, are described in the drawing above. A bulletin describing the many equipment components available in more detail is available upon request. And your man from NATIONAL can show you, by your own foundry records, how the Utility Unit can pay for itself in savings, in as little as two years' time. Write for details.

TYPICAL SAVINGS BY USERS OF NATIONAL UTILITY UNIT:

Six men now do the work of 12 . . . $15,000 savings in manpower alone in first year of operation . . . earnings of operators up—overtime down. Mix-Muller prepares more sand in 6 hours than previous equipment did in 12 . . . unit paid for itself in 2 years of operation.
*Jobbing foundry, Indiana

Saved over $25,000 in 1956 . . . Working conditions improved 100% . . . Now clean a 500 ft. long floor in 3 hours—formerly took entire 8 hour shift . . . Save about $5.40 per ton of casting . . . "Sand conditioning operations now close to a mathematically controlled process" . . . Utility Unit amortized in 3 years' time.
*Midwestern foundry.

*Names of these users and other evidence of Utility Unit performance are available. Your NATIONAL agent can arrange for you to visit a National-equipped foundry in your area.

F-458

NATIONAL ENGINEERING COMPANY
646 Machinery Hall Bldg.
Chicago 6, Illinois

ANOTHER! PROVEN PRODUCT OF THE PRACTICAL FOUNDRYMAN BY NATIONAL

G. Hazlett product engineer, Vulcan Mold & Iron Co., Latrobe, Pa. . . . Ashley B. Sinnett, recently assistant secretary, American Foundrymen's Society, has been elected secretary and Edward R. May has been made treasurer.

SCRAP RISING: Prices of iron and steel scrap are continuing the slow but steady increase that started the middle of July. Average quotations currently are at the 1958 high, while a year ago the market was dropping sharply. The recent rise in steelmaking grades parallels the upturn in steel plant operations.

AOA EXPANSION: American Ordnance Association has started to intensify its technical operations. Among the planned steps is organization of a new Materials and Production Techniques Division, which will include as sections those committees now listed under the Advisory, Technical and Research Group. Addition of five more sections has been recommended, including one on castings.

FOUNDRIES SOLD: Austenal Inc., manufacturer of dental and surgical specialties, has been acquired by Howe Sound Co., a holding company. Austenal has investment casting foundries at Dover, N. J., Chicago, and Laporte, Ind. Illinois Precise Casting Co., Chicago, also an investment casting foundry, has been purchased by Roth Mfg. Co., Niles, Ill., and will be operated as a division of Roth. The latter is a wholly owned subsidiary of Vapor Heating Corp., Chicago.

MISCELLANY: Griffin Wheel Co. has started operations at its new Muncie, Kans., steel foundry, its fourth plant for the production of cast steel car wheels . . . Since April, industrial production (as measured by the Federal Reserve Board index) has regained almost 60 per cent of the recession loss of the preceding eight months . . . C. B. Hunt & Son Inc., Salem, Ohio, air and hydraulic control valve manufacturer, has changed its name to Hunt Valve Co. . . . Crouse-Hinds Co., Syracuse, N. Y., has bought 50 per cent of the stock of Domex S. A. de C. V., Mexico City manufacturer of cast electrical conduit fittings . . . Air Reduction Sales Co. has started construction of a new oxygen and nitrogen plant at Denver . . . American Charcoal Co., Detroit, has formed a new Chemical Products Div. to handle chemicals used in diecasting and other forms of metalworking.

Prices of Foundry Metals and Coke

(As of Sept. 22, 1958)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$18.00-18.50
OVEN	
Birmingham	$28.85
Buffalo	30.50
Detroit	30.50
Erie, Pa.	30.50
Indianapolis	29.75
Kearny, N. J.	29.75
Milwaukee	30.50
Montreal, Que.	31.00
Neville Island (Pittsburgh)	29.25
New England, deld.	31.55
Painesville, O.	30.50
Philadelphia	29.50
St. Louis	31.50
St. Paul	29.75
Swedeland, Pa.	29.50
Terre Haute, Ind.	29.75

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$68.50	$69.00
Birmingham	62.50	66.50
Buffalo	66.50	67.00
Chester, Pa.	67.00	67.50
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Everett, Mass.	68.00	68.50
Fontana, Calif.	75.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	68.40	68.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 27.00; tin bronze, No. 225, 36.00; No. 245, 30.75; High-leaded tin bronze, No. 305, 31.25; No. 1 yellow, No. 405, 22.75; manganese bronze, No. 421, 24.50.

ALUMINUM: 99 per cent plus primary ingots 26.80. Secondary No. 12 alloy, 21.50-22.00. Deoxidizing grades: No. 1, 22.75; No. 4, 17.75.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 26.50, delivered Connecticut valley.

ZINC: High grade 11.00, delivered. Die casting alloy No. 3, 12.25; No. 2, 12.75, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$35.00-36.00*	$53.00-54.00	.....	.....	.....	.....	$51.00-52.00
Boston*	**27.00	**33.00-34.00	.....	.....	**36.00-38.00	.....	.....
Buffalo	34.00-35.00	**41.00-42.00	.....	.....	**45.00-46.00	.....	59.00-60.00
Chicago	46.00-47.00	46.00-47.00	.....	52.00-53.00	52.00-53.00	57.00-58.00	60.00-62.00
Cincinnati*	**38.50-39.50	**42.00-43.00	**34.00-35.00	.....	**46.00-47.00	.....	**55.00-56.00
Cleveland	39.50-40.50	44.00-45.00	36.00-37.00	49.00-50.00	49.00-50.00	60.00-61.00	57.00-59.00
Detroit*	**32.00-33.00	**36.00-37.00	**26.00-27.00	**37.00-38.00	.....	.....	.....
Los Angeles	32.00	**39.00	.....	.....	.....	.....	.....
New York*	33.00-34.00	35.00-36.00	33.00-34.00	.....	.....	.....	.....
Philadelphia	40.00	40.00	44.00	.....	48.00-50.00	58.00-59.00	57.00-58.00
Pittsburgh	43.00-44.00	43.00-44.00	.....	39.00-40.00	51.00-52.00	.....	57.00-59.00
St. Louis*	38.00	47.00	38.00	48.00	.....	.....	52.00
San Francisco	32.00	42.00	28.00	40.00	40.00	.....	.....
Seattle	30.00	31.00	28.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Whitehead's
FINE SILICA SANDS
for Fine Finish Castings and Shell Molding

Whitehead offers the widest variety of fine washed and unwashed silica sands . . . all laboratory-tested in a Whitehead laboratory in each of the areas represented.

DIVIDING CREEK, New Jersey
Fine Washed Silica Sands

Retained on Sieve #	Grade D #71	Grade D Special #75	Grade E #96	Grade Overflow #118	Grade Superior #158
30	none	none	none	none	none
40	2.0	1.0	1.0	.2	.2
50	9.8	4.8	7.6	3.2	1.8
70	26.4	14.0	20.4	13.2	4.6
100	41.0	40.2	31.8	29.0	11.2
140	15.0	29.8	17.2	20.2	22.4
200	4.4	8.2	10.8	15.4	25.6
270	.8	1.2	5.6	8.8	14.0
Pan	.6	.8	5.6	10.0	20.2

McCONNELLSVILLE, New York
Fine Unwashed Silica Sands

Retained on Sieve #	#103	#130	#155	#180	#230	#275
30	.3	.2	none	none	none	none
40	.5	.2	.4	"	"	"
50	4.2	.4	1.4	"	.2	"
70	13.6	1.6	3.2	.4	.2	.2
100	26.1	12.4	10.2	2.5	.4	.6
140	25.7	32.8	22.0	18.0	4.0	1.2
200	20.8	37.2	30.0	35.9	21.4	6.4
270	5.5	9.8	14.2	17.4	21.4	11.2
Pan	3.3	5.4	16.8	23.8	46.4	80.4
Very Fine	none	none	1.8	2.0	6.0	

NEW ENGLAND
Marion Fine Washed Silica Sand AFSF #105

Sieve #	Retained
+6	none
12	"
20	"
30	"
40	.6
50	1.4
70	6.0
100	30.6
140	34.4
200	19.2
270	4.6
Pan	3.2

LEADER IN FOUNDRY SANDS SINCE 1841

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.
NEW ENGLAND OFFICE
75 Westminster St., Providence 1, R. I.

Manufacturers of:

LYQUAGRIP
Ready-to-use core paste

DOB-IT
Ready-to-use core mudding compound

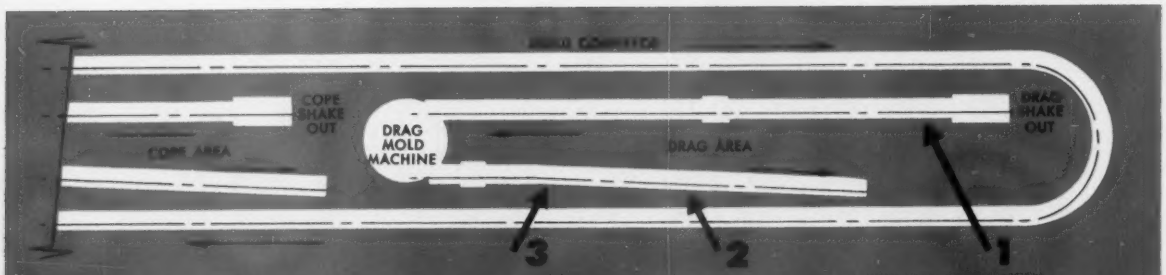
JOINT-SEAL
Plastic compound for perfect sealing

LYQUAFLOUR
For cleaner surface, better shakeout

LYQUAFACE
The liquid sand grain coating

Circle 580 on Page 131

ANCHOR'S NEW ENGINEERING CAN MEAN IMPORTANT



TYPICAL ANCHOR FLASK HANDLING AUTOMATION

FEATURES

ANCHOR flask handling automation is rugged, resulting in low maintenance costs.

Provides a float of empty flasks and completed molds, increasing flexibility of the mold system and making it less vulnerable to temporary shutdowns.

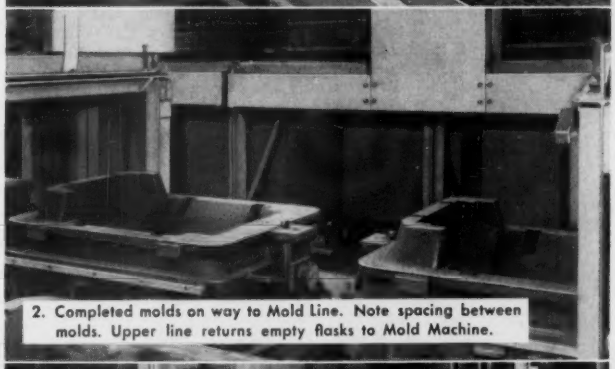
Has ability to index one unit at a time, as required, with less damage to molds.

Affords excellent traction and flask may be transported up inclines or down declines.

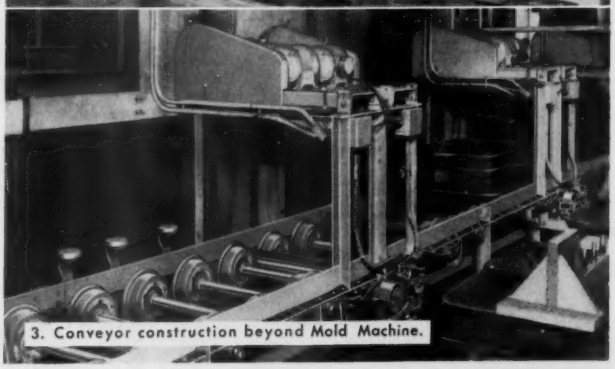
Rubber tired wheels are an improvement over other handling methods.

This type of equipment is adaptable to automatic, semi-automatic, and manual systems.

1. Incline from Drag Shake-out.



2. Completed molds on way to Mold Line. Note spacing between molds. Upper line returns empty flasks to Mold Machine.



3. Conveyor construction beyond Mold Machine.

CONCEPTS IN FOUNDRY CONVEYORS

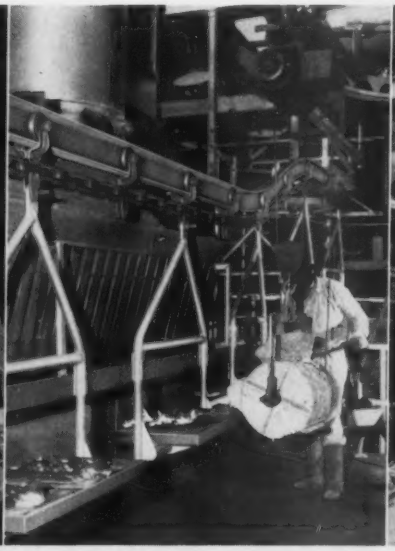
SAVINGS TO YOU . . .

When difficult handling problems have arisen in the foundry industry, *Anchor Steel and Conveyor Company* has been called in to apply imaginative engineering to arrive at a proper solution.

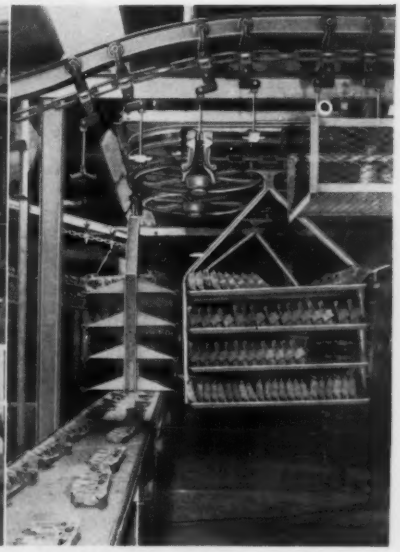
The result has been some very interesting new developments that provide greater efficiency in foundry operation.

If you have such problems in your foundry may we suggest that you too avail yourself of Anchor's wide experience in solving the most difficult handling problems.

ANCHOR UPRIGHT RETURN PALLET CONVEYOR applied to Core Assembly. Conveyor pallet always remains level and returns in the upright position. Pallet drops away from core plate on discharge end, depositing it on anti-friction rollers for transportation to next operation.



ANCHOR 6" OVERHEAD TROLLEY CONVEYOR used in the Shell Mold Process. View shows the pouring station. Conveyor is equipped with Lubricated-for-Life trolleys.



TYPICAL 4" ANCHOR OVERHEAD CONVEYOR used through Core Drying Oven. The trolley seals are omitted and the bearings are flushed and spray lubricated after every cycle.

ANCHOR designs, manufactures and installs many types of custom engineered Conveyors, including Overhead Trolley, Power and Free, Slat Conveyors, "Tow-All" Conveyors, Belt Conveyors, Turntables, Pallet Conveyors, Storage and Assembly Conveyors, and others.

ANCHOR STEEL AND CONVEYOR COMPANY

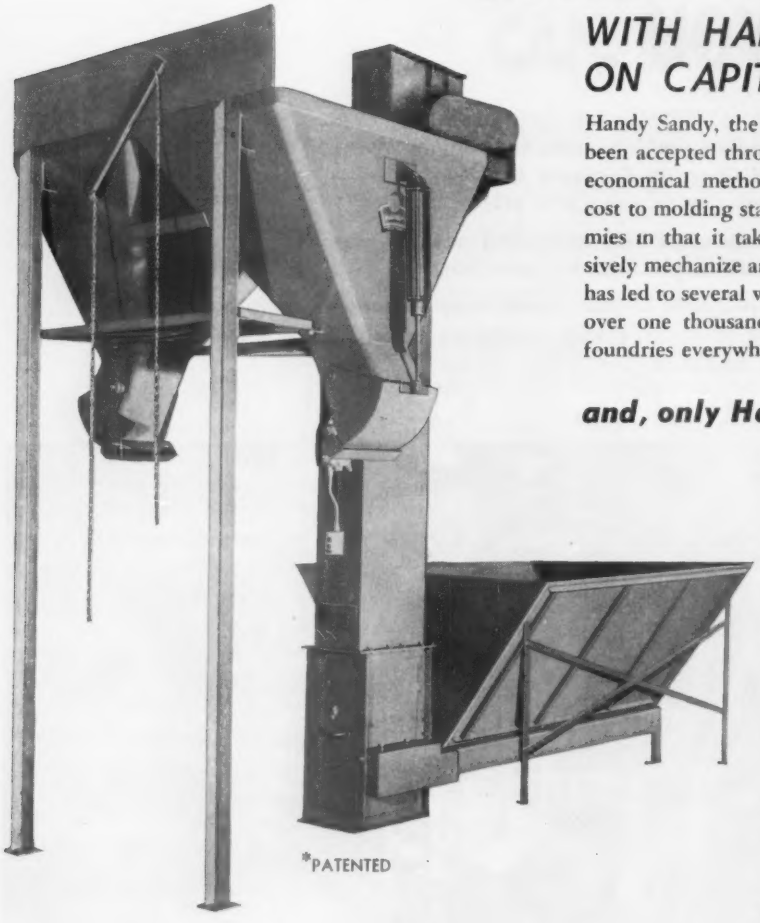
CONVEYORS

DESIGNERS AND MANUFACTURERS

6906 KINGSLEY AVENUE • DEARBORN, MICHIGAN

Circle 581 on Page 131

LOW COST MECHANIZED SAND HANDLING



*PATENTED

WITH HANDY SANDYS SAVE ON CAPITAL INVESTMENT

Handy Sandy, the individual-floor, sand handling unit, has been accepted throughout the foundry industry as the most economical method for furnishing overhead sand at low cost to molding stations. Handy Sandy offers further economies in that it takes a low capital expenditure to progressively mechanize any foundry. In most cases, one installation has led to several within a foundry, and today there are well over one thousand Handy Sandys proving their value in foundries everywhere.

and, only Handy Sandy offers all of these features:

- BUILT-IN AERATOR
- AUTOMATIC HOPPER LEVEL CONTROL*
- SAND VOLUME EQUALIZER
- DRIBBLE GATES*
- AUTOMATIC FEED VOLUME CONTROL*
- LOWER SAND STORAGE HOPPER WITH ENDLESS BELT FEEDER
- AUTOMATIC ELEVATOR TAKEUPS
- LESS HEADROOM
- INSTALLATION FLEXIBILITY
- MANY STANDARD MODELS

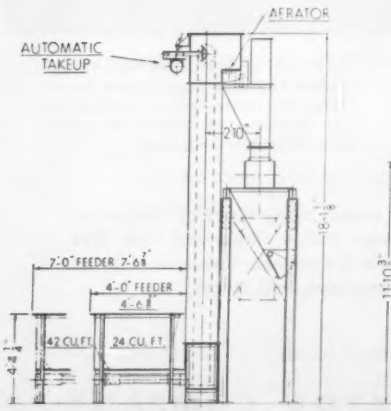
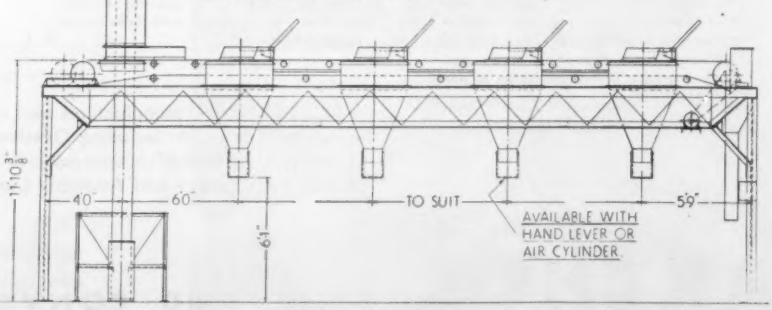
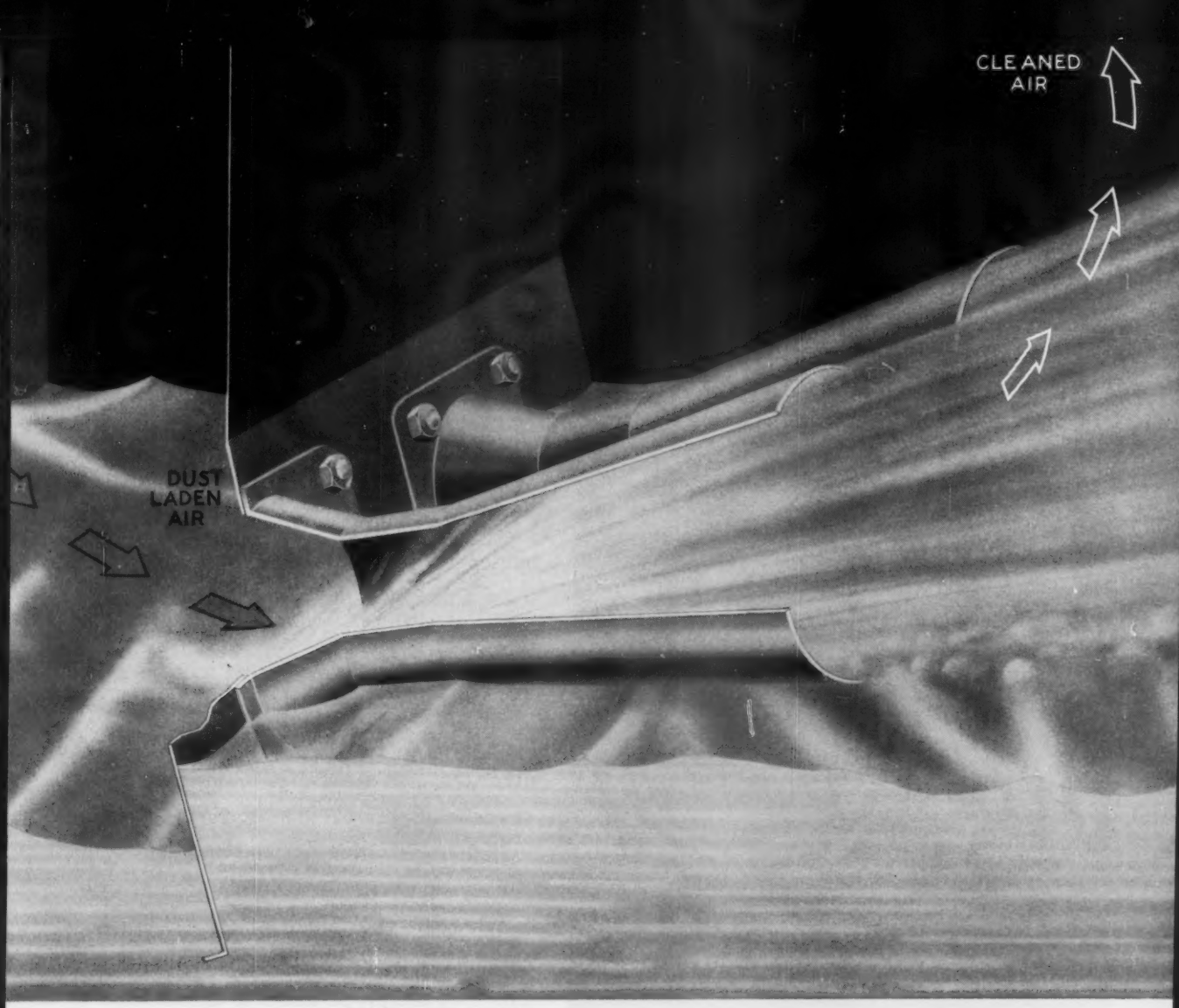


Illustration below shows a typical distribution set up where Handy Sandy can feed up to 20 hoppers with overhead sand. Send today for free literature showing various types of distribution systems using Handy Sandy components.



NEWAYGO engineering company
NEWAYGO, MICHIGAN

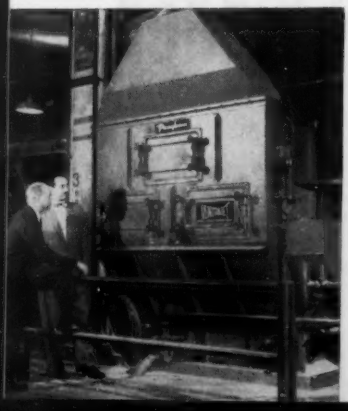
Send for our new 16 mm sound film featuring Progressive Mechanization in 9 foundries. Use of film is free.



Puts the squeeze on difficult dusts

Pangborn Ventrijet Wet Dust Collector uses exclusive venturi tubes for peak efficiency

Pangborn Ventrijet Wet Dust Collector on the job. This is just one of Pangborn's comprehensive line of wet and dry dust collectors.



That pinch-necked venturi tube is the secret behind Pangborn Ventrijet performance. As dust-laden air flows through these tubes, the constriction creates a low-pressure area which draws water into the air stream. The resulting turbulence breaks the water into particles which actually *wash* the dust from the air. The simplicity of Ventrijet design saves money in its ease of installation, its low cost of operation and maintenance.

Although the Ventrijet is particularly suited to collecting hot, moist, inflammable, corrosive and obnoxious dusts, the Pangborn engineering it typifies is important to *any* dust-producing plant. It is not enough to put a dust collector within a plant. An efficient dust control system must be *scientifically* planned, designed and constructed to handle effectively a specific dust problem. This thinking is incorporated into every Pangborn proposal.

The Pangborn Engineer in your area will be glad to go to work for you. He is a dust expert *and will discuss your individual problem at no obligation. And, for more information, write for Bulletin 922 to:* Pangborn Corp., *1400 Pangborn Blvd., Hagerstown, Md. Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS **DUST**

Circle 583 on Page 131

Save Up To 50% In Core Baking Time!

Dexocor yields top results with all ramming processes.

Use Dexocor binder, the amazing new binder for sand molds. Field reports show this *dry* replacement for core oil cuts baking time 30 to 50 percent!*

Savings of fuel dollars and more flexible production scheduling are only two of Dexocor's advantages. Among its other features are: faster mulling... low gas generation... excellent green strength ...high baked strength...uniform density ...easy shake-out...ready collapsibility.

Whether you make small or large castings, simple or intricate, you will profit by the properties of Dexocor. One foundry now uses it in 19 different sand and core mixes!

For the full facts on this amazing new binder and technical assistance in adapting it to your special needs, contact our nearest sales office or write direct.

*Source on request

DEXOCOR® binder

DEXOCOR® is the perfect teammate for MOGUL® and KORDEK® binders and GLOBE® dextrines

CORN PRODUCTS SALES COMPANY · 17 Battery Place, New York 4, New York

When this door comes down . . . so does your blast cleaning cost!

Abrasive-tight door on Rotoblast Barrel slashes "lost abrasive" costs

Look at it. That door on the Pangborn Rotoblast Barrel is engineered to prevent waste. Heavy steel plates . . . an exclusive arrangement that permits raising the door for easy maintenance . . . *clamp*-closing to make it really abrasive-tight! As a result, here is another way that Pangborn Rotoblast Barrels save you money.

This door is just one of the many benefits built into Rotoblast Barrels. Efficient Rotoblast operation, for example. Automatic control. Ease of maintenance. Plus specific construction features that all add up to *better* cleaning in *less* time for *lowest* cost per ton.

Pangborn Rotoblast Barrel for efficient batch cleaning. Available in 1½, 3, 6, 12, 18, 20, 32, 72 and 102 cubic foot sizes.

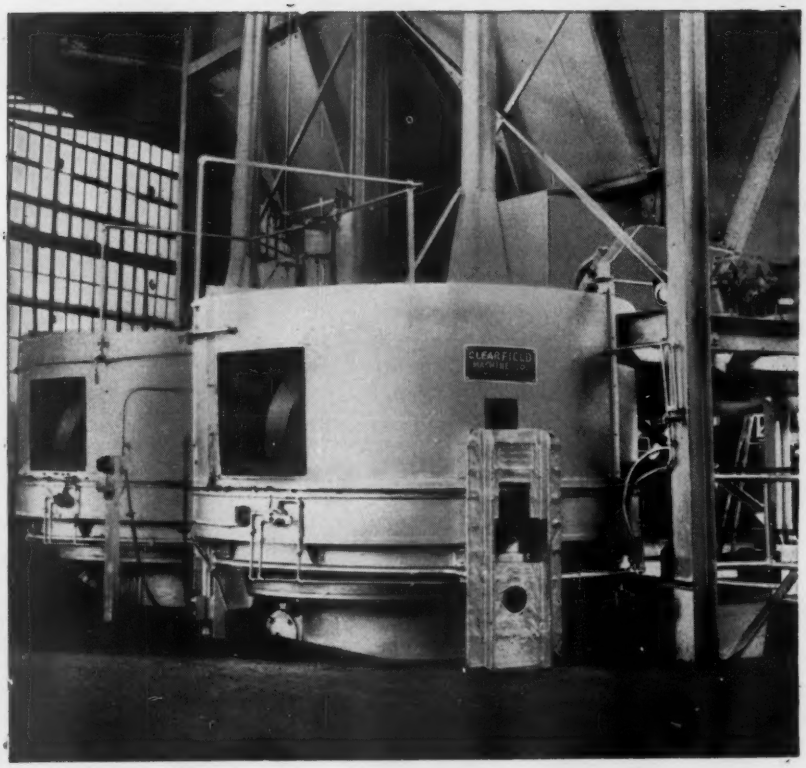
The Pangborn Engineer in your area will be glad to take off his coat and go to work on your cleaning problem at no obligation. And for complete information on Rotoblast Barrels, write to: Pangborn Corp., *1400 Pangborn Blvd., Hagerstown, Md. Manufacturers of Blast Cleaning & Dust Control Equipment.*

Clean it fast with Pangborn ROTOBLAST®

Circle 685 on Page 131

the

Clearfield Mixer



is
engineered,
designed
and built to *prepare sand properly*

Write today for Catalog No. 83. Get complete details on the tested efficiency of Clearfield Mixers.

Properly prepared sand for best foundry results doesn't just happen. It's the natural result of using correct equipment and a matter of precision in controlling all factors involved. Clearfield Mixers always give you properly prepared sand, and there is a Clearfield for every requirement.

***CLEARFIELD MIXER** mixes, tempers, aerates*

CLEARFIELD MACHINE COMPANY

Clearfield, Pennsylvania, U. S. A.

Snag grinding a center tuyere plate used in industrial furnaces.

KEYSTONE

Our unique personalized service gets you the right wheel for the right job . . . at the right time.

Keystone Abrasive Wheel Company

Carnegie, Pennsylvania • Phone: WAlnut 1-7036

Keystone quality wheels and service get results, fast. Call us today!

DISTRIBUTORS: Desirable territories open.

Circle 587 on Page 131

Taylor & Company specializes in versatility with HANNA PIG IRON

Taylor & Company, Inc., Brooklyn, New York, casts them little and big with equal ease—from dry-sand castings that weigh tons, to light close-tolerance parts cast by the shell-molding process. As many as 6,000 different patterns are used by Taylor in an average month.

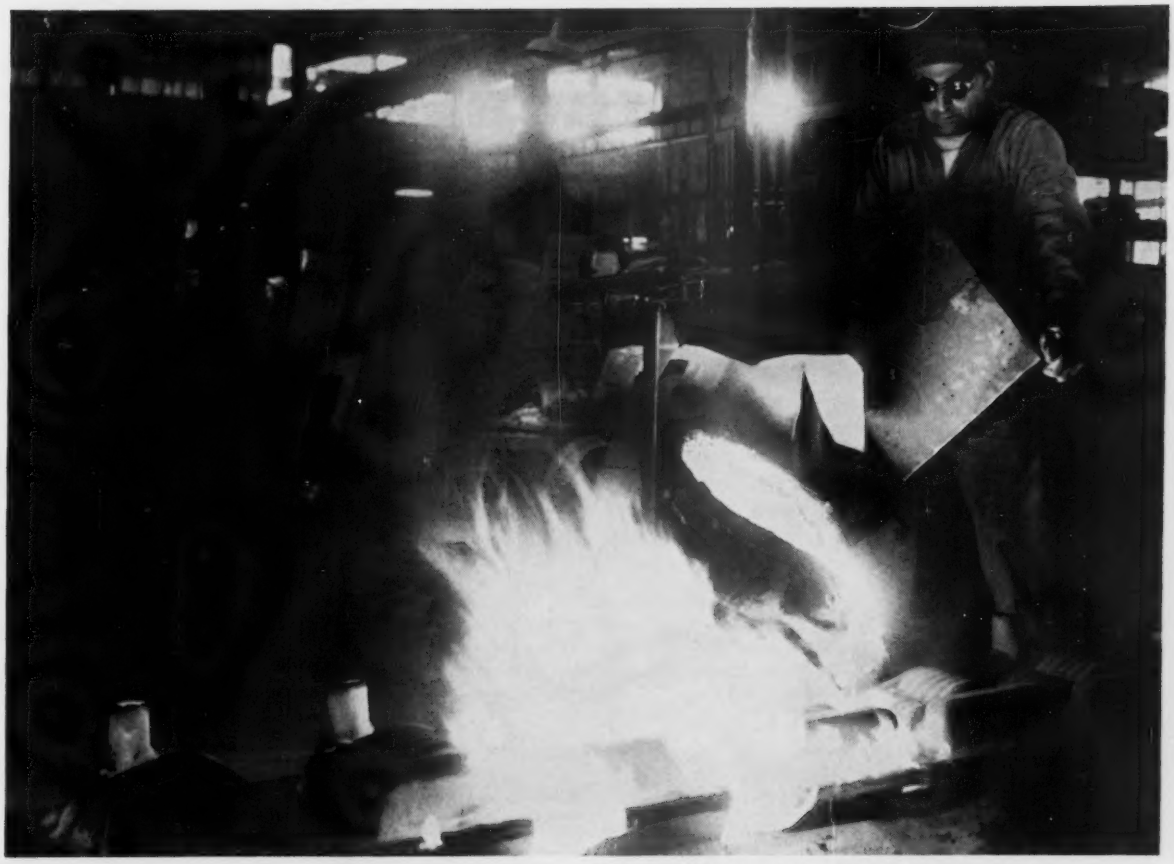
For seventy-five years, this merchant foundry has turned out a variety of sizes and shapes with the aid of high-quality Hanna pig iron, especially Hanna Malleable and Hanna Silvery grades. President William Z. Taylor has never failed to find Hanna a dependable source of supply for any analysis he needs to meet his customers' requirements.

Whatever you cast, there's a Hanna iron to do it best. All regular grades of pig iron, plus HannaTite and Hanna Silvery, are available in 38-pound pigs and the smaller HannaTen ingots. For prompt service, call on one of Hanna's trained representatives.

△ *This 6-ton dry-sand casting will be a machine tool base that stands up to vibration and shock, provides a rock-steady foundation for accurate work.*

◁ *These small parts were cast to close tolerances by the shell-molding process, and need little or no machining.*

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION



Shell molds produce 25% saving at Anstice Foundries.

Foundry TRIPLES productivity with shell molds

"We've more than tripled our production rate on these castings by switching from green sand to shell molds.

"Now, when a customer needs castings on short notice, we can really give him service!"

So declares Harry Hanna of Anstice Foundries, Rochester, N. Y., a firm whose experience with shell molding dates back just two years. Anstice, like many foundries, uses Durez foundry resins exclusively.

Costs curbed 25%

Higher productivity is reflected in lower costs at Anstice, since shell molds can be produced quickly without pulling highly skilled labor off other jobs.

Cost of producing castings with shell is about 25% less than with green sand. This economy has enabled Anstice to pass on substantial price reductions to customers.

"Besides cutting costs, shell molding gives us an intermediate range of accuracy we couldn't achieve before, except by going to die casting," says Mr. Hanna. On one shell-molded job, for example, Anstice holds a 1/16" finishing allowance specified by the customer.

Smoother bore, better fins

Two other castings in point are finned grey-iron cylinders for air-compressor engines, weighing 20 and 40 pounds. Anstice makes both molds and the core for the smaller casting on a 20 x 30" shell molding machine, using sand bonded with Durez 18123 resin.

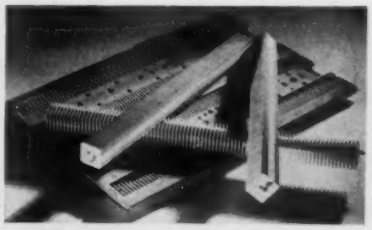
The shell core makes possible a smoother bore and eliminates much machining by the customer. Because of this advantage, serious consideration is being given to coring the larger casting in shell also.

Another example is a 36-inch-long finned aluminum heating casting for an electric baseboard heater. The heat source, a rod-type heating element, is embedded in the finned casting.

The combination of rod insert, deep draw, and thin fins presented some rocky problems in mold design, all of which have been worked out to the complete satisfaction of Anstice and the customer.

Send for new "Guide"

More foundries every month are reaping the benefits of shell molding with Durez resins. If *you're* interested in its high-productivity—low-cost aspects, send for a free copy of the *latest* 32-page "Durez Guide to Shell Molding." It's completely revised, fully illustrated —gives you up-to-the-minute information on patterns, materials, mixing, temperatures, lubricants, molds, cores. Write for it today.



Aluminum fins require less finishing when cast in Durez-bonded shell molds.

DUREZ® HOOKER CHEMICALS PLASTICS

PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION

1010 Walck Road, North Tonawanda, N. Y.

Circle 589 on Page 131

How Milt Ekberg tripled cutting

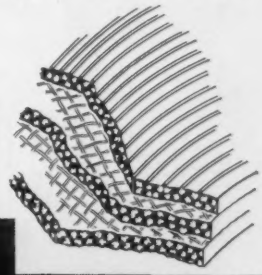
Milt Ekberg is Executive V. P. of Bay State distributor Johnson deVou, Inc., Springfield-Worcester, Mass. Twenty-five years as an abrasive engineer have given him experience that is as deep as it is wide and varied.

speed safely at Chapman Valve

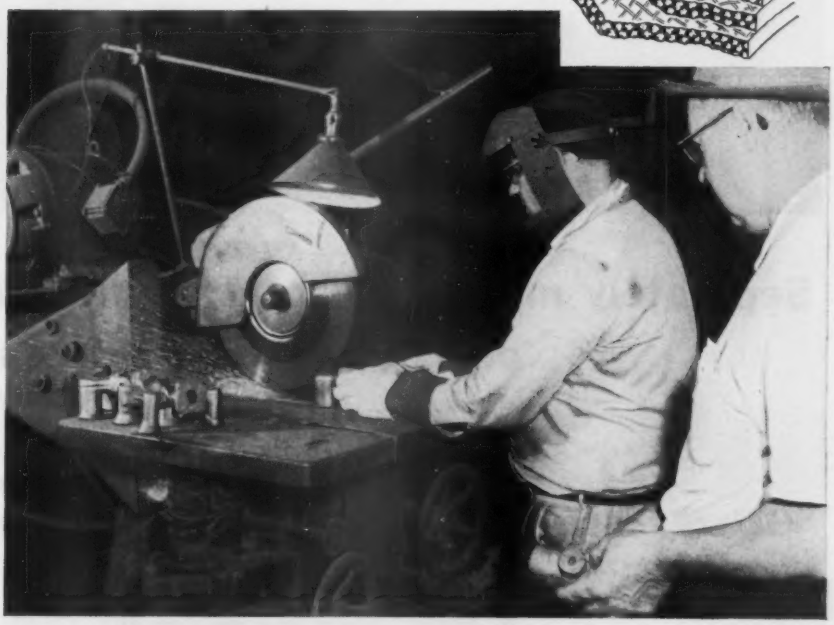
There were two big disadvantages in the old-time method of torch-cutting gates and risers off valve-body castings: A separate grinding job was required to finish off the cuts smoothly . . . and the torch-cutting method was slow and tricky. But safety engineers at The Chapman Valve Manufacturing Company, Indian Orchard, Mass., wouldn't approve using an abrasive cut-off wheel because of the danger that the wheel might shatter and injure operators.

They wouldn't approve, that is, until Milt Ekberg came up with Bay State's now famous BZ2AA reinforced cut-off wheel. Exhaustive tests of wheels supplied by all leading manufacturers proved that the BZ2AA was not only the safest but far and away the fastest, too . . . *three times* as fast, in fact, as torch-cutting. Long wheel life added further to the economies effected by the BZ2AA.

Like Milt Ekberg, your own Bay State distributor is a trained abrasive specialist. He may well have a simple, cost-cutting solution to some problem that seems insoluble simply because you're too close to it. In any case, he's a man who is well worth knowing because . . . *better grinding at lower cost, that is his business.*



Cut-away section of BZ2AA wheel shows reinforcement between layers of bonded abrasive. Improved Bay State bond formulation and bonding technique result in accurate control and close matching of wear rates of all three major components of wheel . . . bond, reinforcement and abrasive.



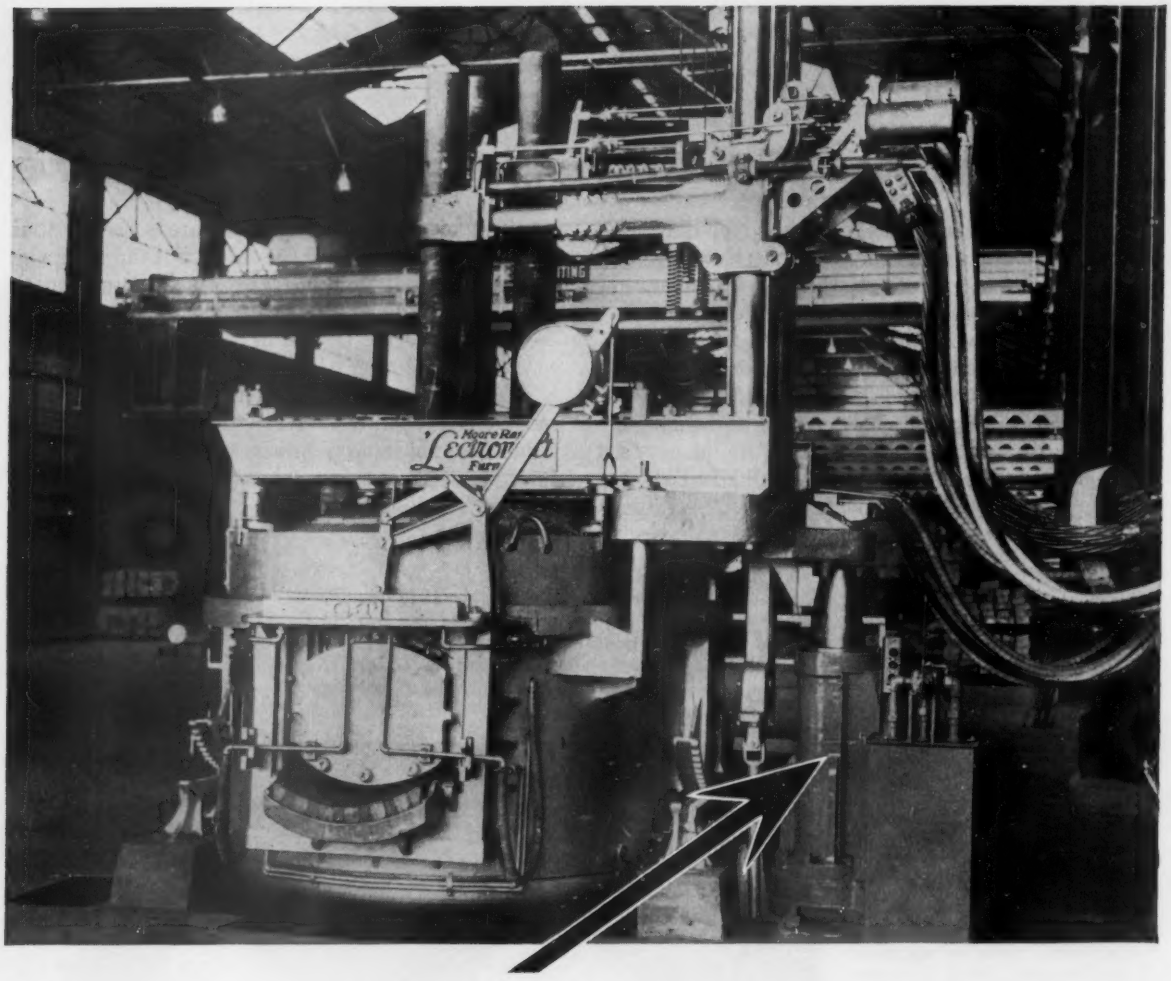
Steel foundry foreman Leo Labossiere, with 30 years foundry experience, watches operator Teddy Crepeau remove gates and risers, grind smooth finish in one swift and uncomplicated operation using BZ2AA reinforced cut-off wheel.

BAY STATE WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

Circle 590 on Page 131



Separately mounted roof lift-and-swing mechanism on Lectromelt Furnaces . . .

Offers these advantages

★ No heavy parts attached to furnace shell to cause strain and distortion

★ No jarring of roof, electrode arms or ram parts when heavy charges are dropped into the furnace

★ Allows uniform heat radiation all around the shell

★ Roof lift mechanism is away from excess furnace heat

★ Roof can be lifted higher, permitting larger charges

★ Shells can be readily interchanged

★ ★ ★

All good reasons for specifying Lectromelt furnaces. They're described in Catalog No. 10. Lectromelt Furnace Division, McGraw-Edison Company, 314 32nd Street, Pittsburgh 30, Pennsylvania.

Lectromelt®

McGRAW EDISON

CANADA: Canefco Limited, Toronto...ARGENTINA: Master Argentina, Buenos Aires...ITALY: Forni Stein, Genova...ENGLAND: Electric Furnace Co., Ltd., Weybridge...GERMANY: Demag-Elektrometallurgie, GmbH, Duisburg...SPAIN: General Electrica Espanola, Bilbao... FRANCE: Stein et Roubaix, Paris... BELGIUM: S. A. Stein & Roubaix, Bressoux-Liege...JAPAN: Daido Steel Company, Ltd., Nagoya

THE NEW DEMMLER 70

A YEARS-AHEAD DESIGN BLOWS OR SHOOTS ANY TYPE CORES FROM OUNCES TO 10 POUNDS IN WOOD OR METAL BOXES

Latest Sleeve-Type Stationary Magazine: Slot design for most efficient operation; suitable for all core sand mixes.

Shoot Heads: Interchanged in seconds; no wrenches needed.

Quick-Change Blow Plate: Cam-operated clamps; no wrenches needed.

Horizontal Clamps: Quickly adjustable, horizontally and vertically without wrenches.

Fully-Enclosed Draw Mechanism: Six-inch accurate draw stroke.

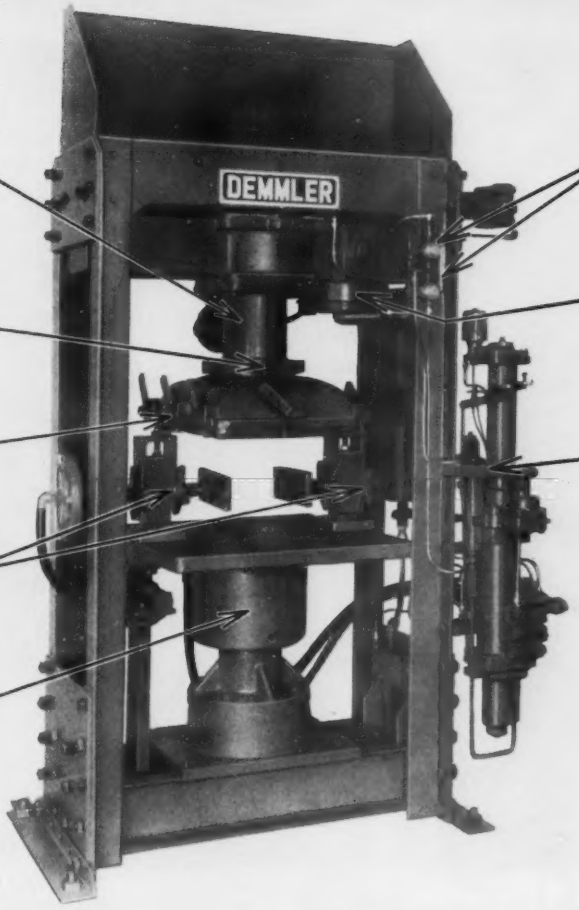


Table Height Adjustment: Push-button operated, eight-inch hydraulic adjustment.

Fast-Acting Large Size Diaphragm-Type Blow Valve: Easily replaceable diaphragms are the only wearing parts.

Automatic Sequence Control: One push of operating lever puts machine through a complete cycle.

Safety Controls: Machine is inoperative unless core box is properly located.

GET MORE FROM YOUR FOUNDRY DOLLAR

The new DEMMLER 70 is a low-cost, high-speed production machine, ruggedly constructed for heavy-duty use. Maximum versatility and ease of maintenance make this DEMMLER core blower a profitable addition for your foundry. Write us for more information. DEMMLER — since 1909 — the first name in core blowers.

DEMMLER MANUFACTURING COMPANY • KEWANEE, ILLINOIS

PRECISION CORE BOX VENTS

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.

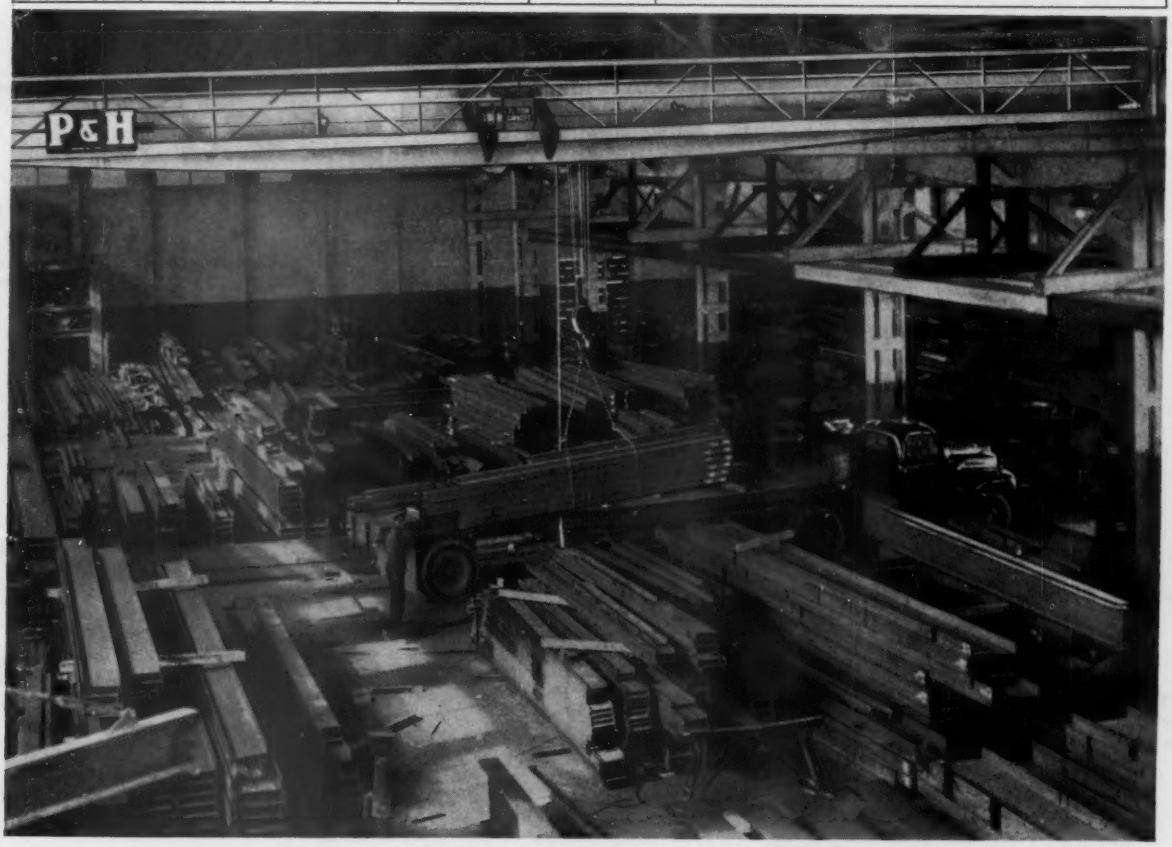
HL 150 MESH VENTS

A new general purpose vent which practically eliminates the cleaning coarser screens demand. Write for literature on Demmler vents.

Circle 592 on Page 131

CHECK → P&H TRAV-LIFT SPECS

You can own a quality P&H crane for less money than you think!



Only P&H Trav-Lift® offers all these big-crane features in the 1 to 20 ton crane class:

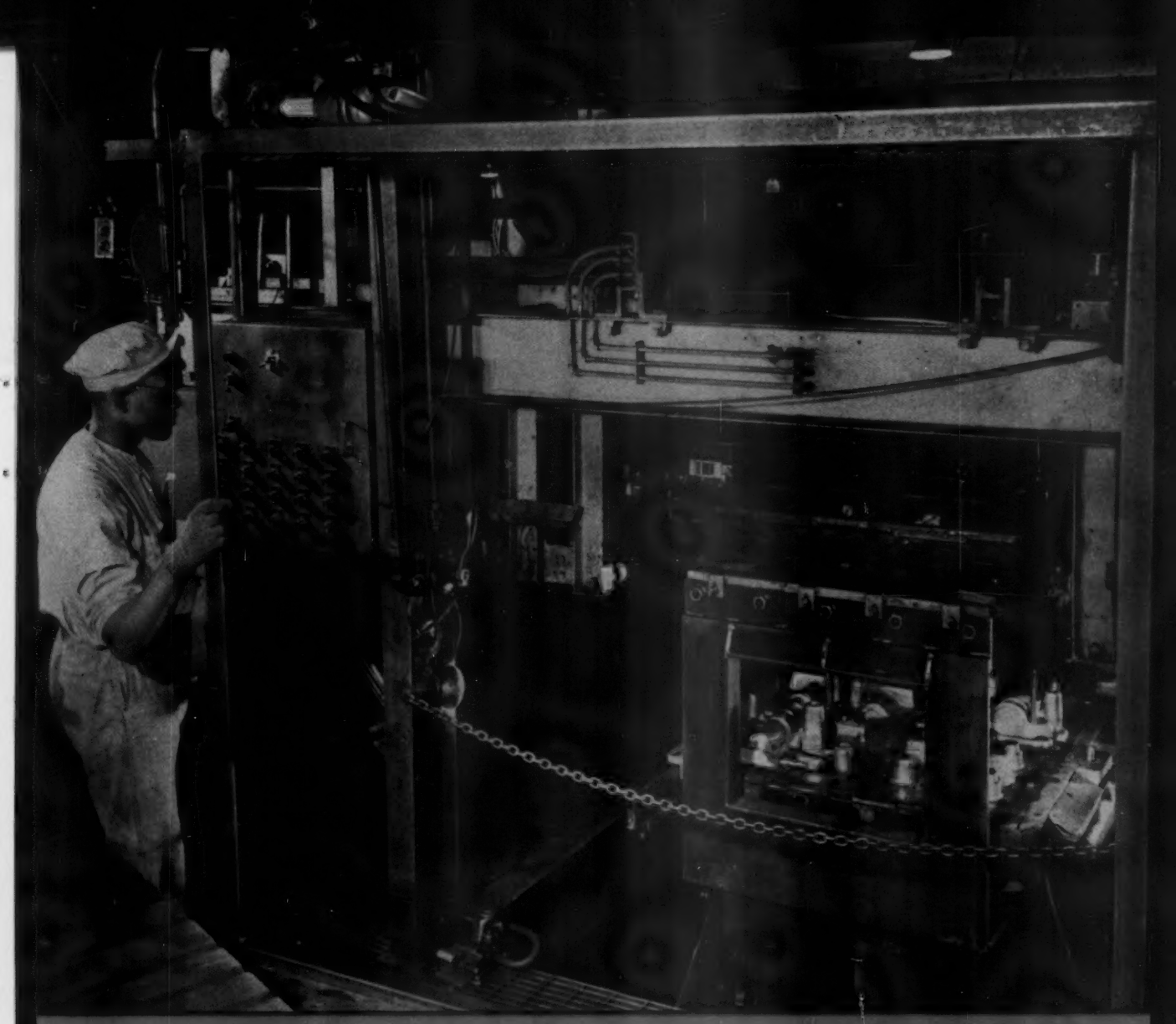
- P&H one-source responsibility for **all** parts and service
- Electrical equipment designed specifically for crane service
- DC rectifier brakes that cut maintenance in half
- Cab or floor operated... or both!
- Variable speed 5-step magnetic control
- Anti-friction bearings throughout
- All-welded steel construction
- Bridge engineered for vertical strength and lateral stability
- Heat treated gearing throughout
- Forged steel wheels

Why settle for less than the best — when P&H *quality* cranes cost so little? Write for Trav-Lift Bulletin C-51, Dept. 116N, Harnischfeger Corp., Milwaukee 46, Wisconsin.

HARNISCHFEGER P&H ... quality and service for 74 years

Circle 593 on Page 131

Circle 594 on Page 131→



stationmaster SUCCESS STORY

AT
ALBION MALLEABLE
IRON COMPANY

HERMAN

high speed molding AND flexibility

A high rate of production, 200 or more complete molds per hour, using as many as 16 different patterns, is being achieved on the molding line at Albion Malleable Iron Co., Albion, Mich.

This remarkable installation makes effective use of the Herman Pneumatic Machine Company's relatively new two station indexing molding machine development, the Stationmaster.

One pair of jolt-squeeze cope and drag machines permit simultaneous production of castings weighing from 1 to 30 lbs. at a rate of 140 to 150 tons of metal poured per 8-hour shift for pearlitic and ferritic malleable processing.

Of interest to economy-minded foundrymen is the fact that this Herman Stationmaster unit is performing at Albion in place of 12 squeezers and 5 cope and 5 drag machines previously required.

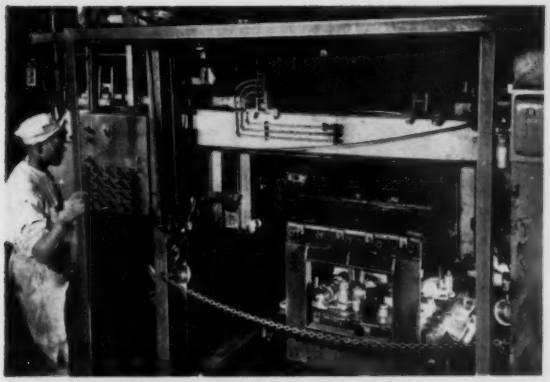
Patterns are mounted on 18 inch square quadrants, any one of which can be removed and another substituted.

Control is completely automatic on this particular installation at Albion, but the Stationmaster may also be controlled semi-automatically.

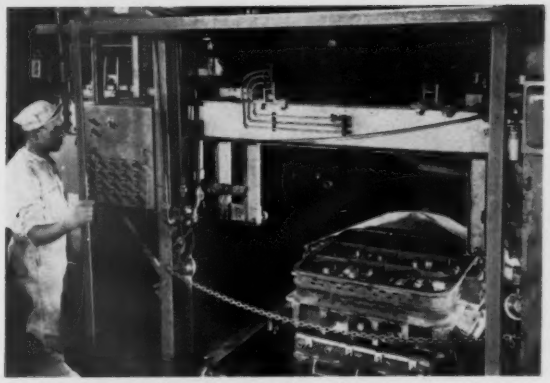
The indexing principle accelerates production since one mold can be filled, jolted and squeezed while another mold is simultaneously being stripped, and removed from the Stationmaster.

The Herman Pneumatic Machine Co. numbers this outstanding installation among several, here and abroad, where the Stationmaster's ability to produce quality, uniform castings is amply proven.

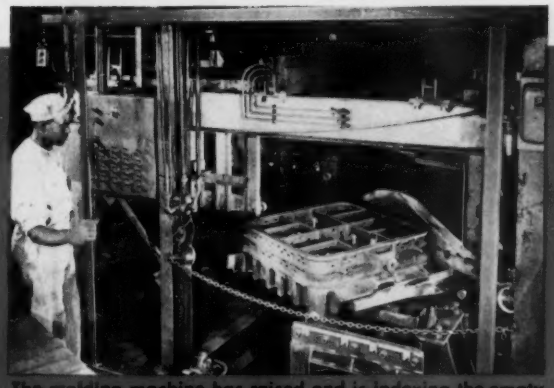
SEQUENCE OF OPERATION



The cope mold has been discharged and the empty cope flask has been charged into place ready to be lowered onto the pattern.

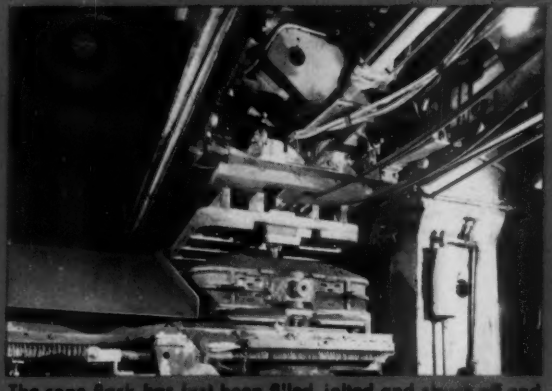


The empty cope flask has just been lowered onto the cope pattern at the stripping station.

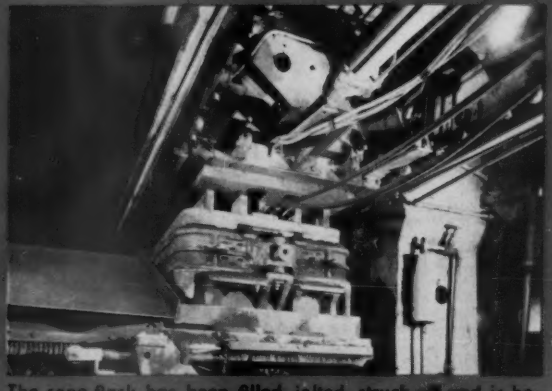


The molding machine has raised and is indexing the empty cope flask to the Fill-Jolt-Squeeze station.

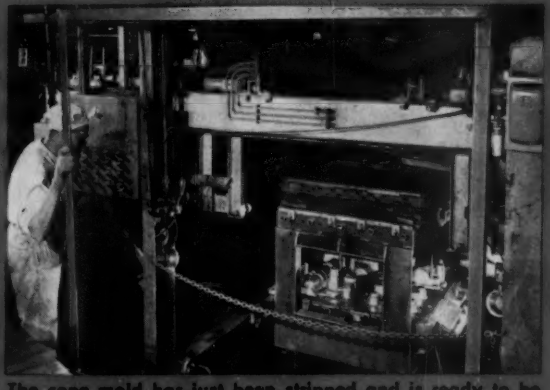
The cope flask has been filled, jolted and is being struck off.



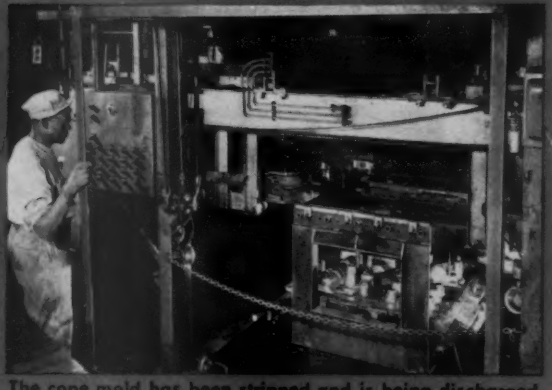
The cope flask has just been filled, jolted and struck off and is ready to be squeezed.



The cope flask has been filled, jolted, struck off and is being squeezed.

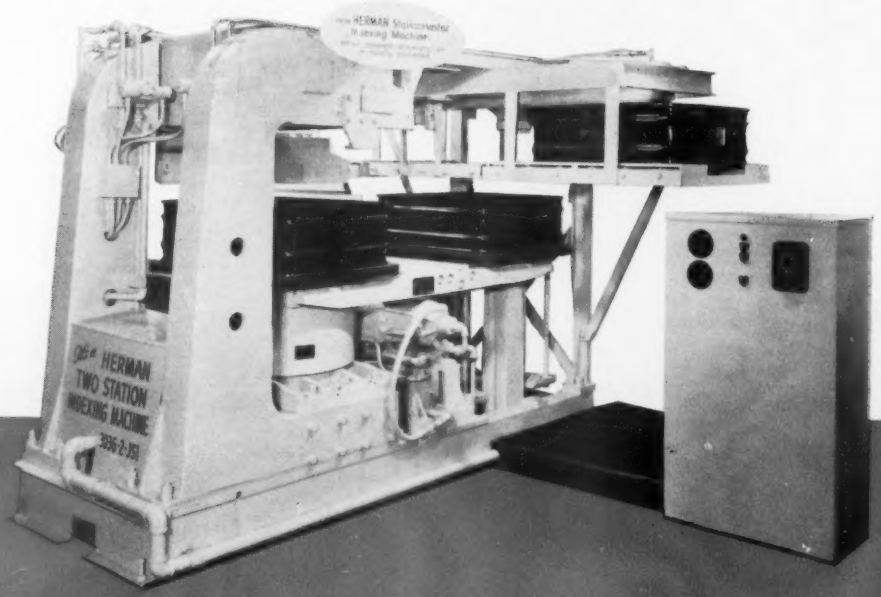


The cope mold has just been stripped and is ready to be discharged.



The cope mold has been stripped and is being discharged. A new flask is being charged onto the stripping rollers.

THE VERSATILE STATIONMASTER



FEATURES:

1. Proper jolt insured by adjustable Bunter Control Valve and Timing Device.
2. Squeeze pressures adjustable to a maximum.
3. Adjustable strike-off bar.
4. Retractable squeeze heads permit direct sand filling through variable sand hoppers mounted on squeeze head supports.
5. Squeeze piston provided with limit stop.
6. Adequate registrations insure accurate location of flask at all positions.
7. Jolting, squeezing pneumatically operated.
8. Other operations controlled by proven pneumatic hydraulic application to insure fast, smooth, positive action.

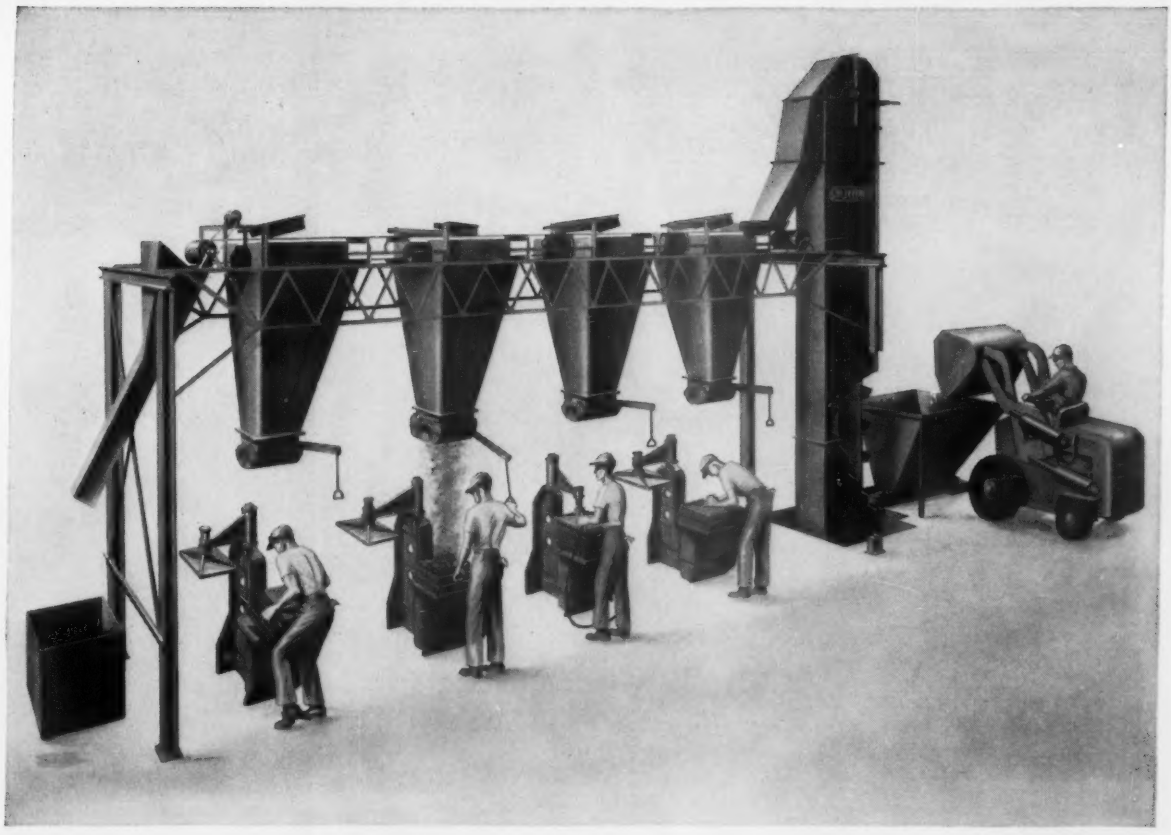
The Stationmaster is one of a complete line of Herman Molding machines, in all types and sizes, to fit all foundry operations.

HERMAN

Best Known Name in Molding Machines

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA



Small foundries gain big foundry advantages with the **JEFFREY** Overhead Sand System

Available for 2, 4, 6 and 8 or more stations

EVEN with as few as two molding stations, you can economically install this Jeffrey overhead sand system. Molders' time is saved, their work made easier. No more having to lift the sand from the floor, because sand flows directly from overhead hoppers into the flasks.

Your molding costs are reduced, production is speeded up, workers are happier.

These Jeffrey overhead sand units were designed to meet the small foundry's need for low-cost equipment that gives it big-foundry advantages. Built as package units, savings made through reduced engineering and manufacturing costs are passed along to you. For detailed information, get in touch with The Jeffrey Manufacturing Company, 907 North Fourth Street, Columbus 16, Ohio.

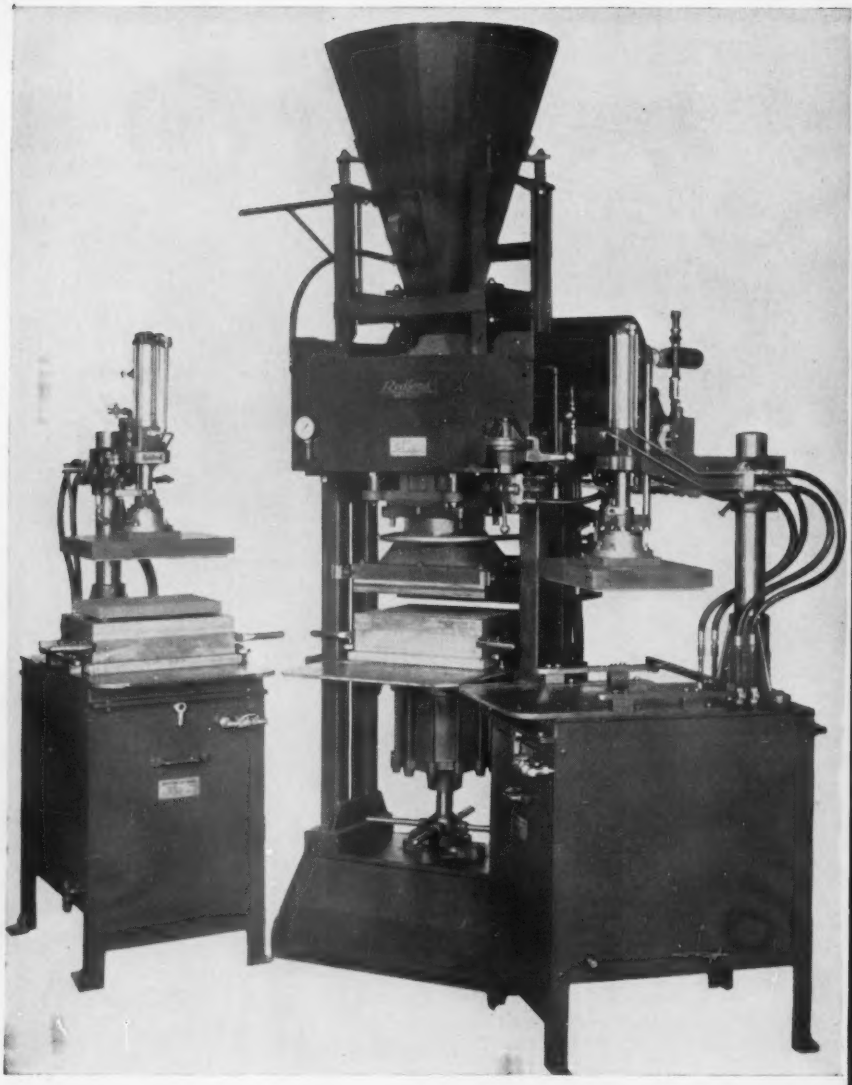
HERE'S HOW IT WORKS

An LMV vibrating conveyor delivers conditioned sand from the hopper to the bucket elevator. It discharges sand directly into the hopper of a 2-station unit—onto the belt conveyor of larger units—from which plows divert it into the hoppers. Thus sand is always available on the molding line.

CONVEYING • PROCESSING • MINING EQUIPMENT . . . TRANSMISSION MACHINERY . . . CONTRACT MANUFACTURING

JEFFREY

Circle 595 on Page 131



REDFORD CO_2 MOLD MAKING EQUIPMENT

Here is a proven way of applying the CO_2 process to the production of small castings. With the above Redford #420-D Core Blower and (2) Model H-2-M Gassing Stations, one mold is being blown and squeezed while another one is automatically gassed and stripped. Up to 80 complete molds (cope and drag) are produced in one hour. Molds are flat and can be stacked for pouring. Metal yield is greatly increased. Very little floor space is required. Millions of small parts have been cast to close tolerances at reduced costs. For complete information write for BULLETIN No. 421.

TYPICAL CO_2 MOLD CASTINGS

½ Actual Size

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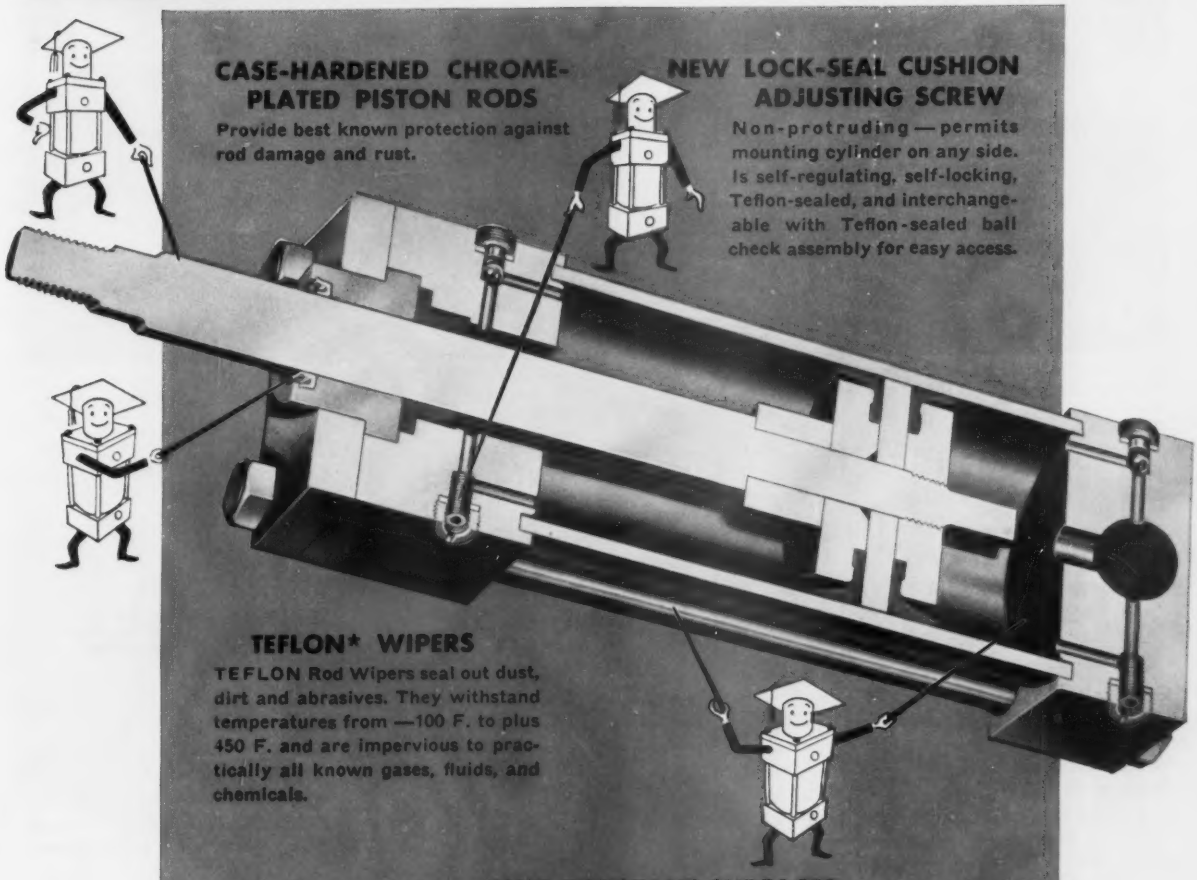
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

At No Extra Cost . . .

AIR CYLINDERS

with EXTRA QUALITY Features!



CASE-HARDENED CHROME-PLATED PISTON RODS

Provide best known protection against rod damage and rust.

NEW LOCK-SEAL CUSHION ADJUSTING SCREW

Non-protruding — permits mounting cylinder on any side. Is self-regulating, self-locking, Teflon-sealed, and interchangeable with Teflon-sealed ball check assembly for easy access.

TEFLON* WIPERS

TEFLON Rod Wipers seal out dust, dirt and abrasives. They withstand temperatures from —100 F. to plus 450 F. and are impervious to practically all known gases, fluids, and chemicals.

RUST-RESISTANT SURFACES

Highest Quality Rust-Resistant Coating provides extra protection during shipment, storage, installation, and operation of air cylinders. Cylinder heads, caps, mountings, pistons, followers, and the unplated portions of piston rods have this finish (not recommended for water service).

* duPont trademark for its tetrafluoroethylene resin.

Other Standard Miller Quality Features include: bar stock steel heads, caps, and mountings; rust-resistant brass barrels; self-regulating, wear-compensating piston rod seals that never require adjustment; space-saving square design; and other features as shown in Bulletin A-105 sent free on request.

Sales and Service from Coast to Coast . . .

Miller Air Cylinders are available in 1½" through 20" bores for 250 psi operation. Select from 19 standard mountings, strokes up to 22 feet, single and double rod end, cushioned and non-cushioned, and over-size rod cylinders. Large selection for immediate delivery.

MILLER FLUID POWER

DIVISION OF FLUID-PARTS CORPORATION

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AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

Circle 597 on Page 131

High-speed Sodium Silicate-CO_2 process is used for making molds for hangar-door counterweights at St. Paul Foundry and Manufacturing Co., St. Paul, Minn. In this "book" molding operation, 30 parts are made with one pour in clamping jacket (*above right*).

These 4 men make 680 rigid, accurate molds in 6 hours with the

SODIUM SILICATE-CO_2 process

Greatly increased production of grey iron castings at the St. Paul Foundry and Manufacturing Co. is credited to the sodium silicate-CO_2 process. The binder used is Archer-Daniels-Midland's "Adcosil," based on Du Pont Sodium Silicate; CO_2 is the curing agent.

Curing takes so little time that 4 men turn out 680 accurate molds in 6 hours for 20 tons of poured metal! Other processes—like green-sand molding—require up to 12 men, yet still can't match CO_2 output. St. Paul Foundry workers prefer CO_2 molding because there are no objectionable fumes. Management likes the extremely close tolerances of the molds—possible because the sand hardens while in *direct contact with the pattern.*

Perhaps your operation can profit with the sodium silicate-CO_2 process, just as the St. Paul Foundry does. Ask your foundry supplier for full details about this timesaving process, or write to Du Pont for names of suppliers of binders based on Du Pont sodium silicate.

E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Rm. N-2533, Wilmington 98, Delaware.

DU PONT SODIUM SILICATE

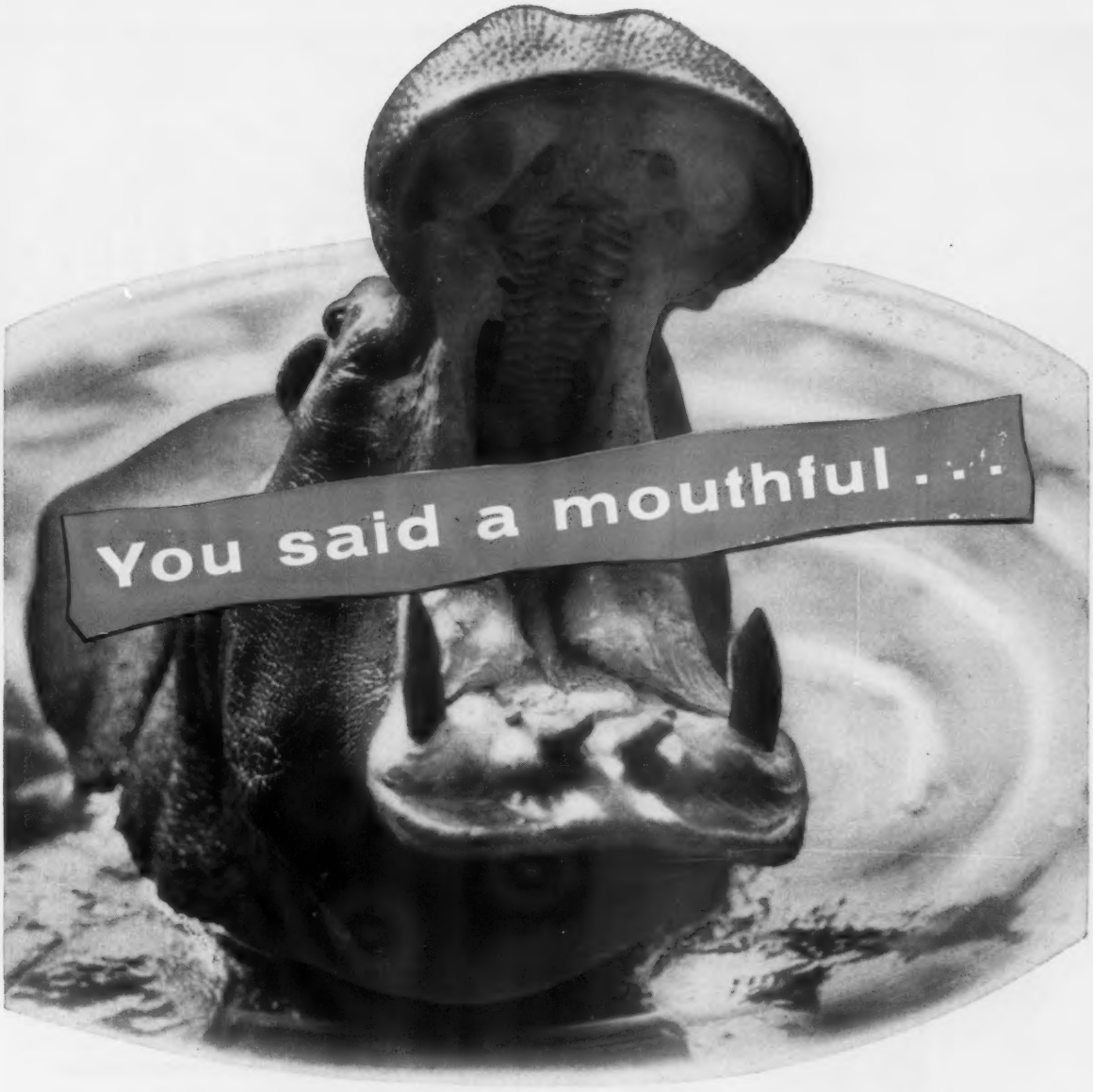
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

CORE BLOWER forces sand into pattern mold, forming an exact duplicate. St. Paul uses mixture of sand and "Adcosil," a binder made by Archer-Daniels-Midland, Cleveland, Ohio.

HARDENED IN SECONDS — 12-second CO_2 gassing reacts with sodium silicate to harden mold while still in pattern. Cured mold won't crack when lifted, is rigid enough to stand on edge without damage.

NO COSTLY SET-UP EQUIPMENT — Molds are placed in clamping jacket for metal pouring. Castings cool overnight. Next morning "books" are shaken out, and jackets made ready for next pouring.



. . . You'll cut snagging time—and save money on cleaning room costs—when you switch to CINCINNATI (PD)° SNAGGING WHEELS, the greatest grinding development in years.

Users all over the nation report that they like the fast, easy cutting action of CINCINNATI (PD) SNAGGING WHEELS. Our customers report, too, that POSITIVE DUPLICATION (PD) means another saving. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *And these better, cost-cutting* (PD) SNAGGING WHEELS *are priced no higher than ordinary wheels.*

So, if snagging problems have you yelling for help, throw your voice in the direction of your CINCINNATI Grinding Wheels distributor and get full details on (PD) WHEELS. Or, contact us direct. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

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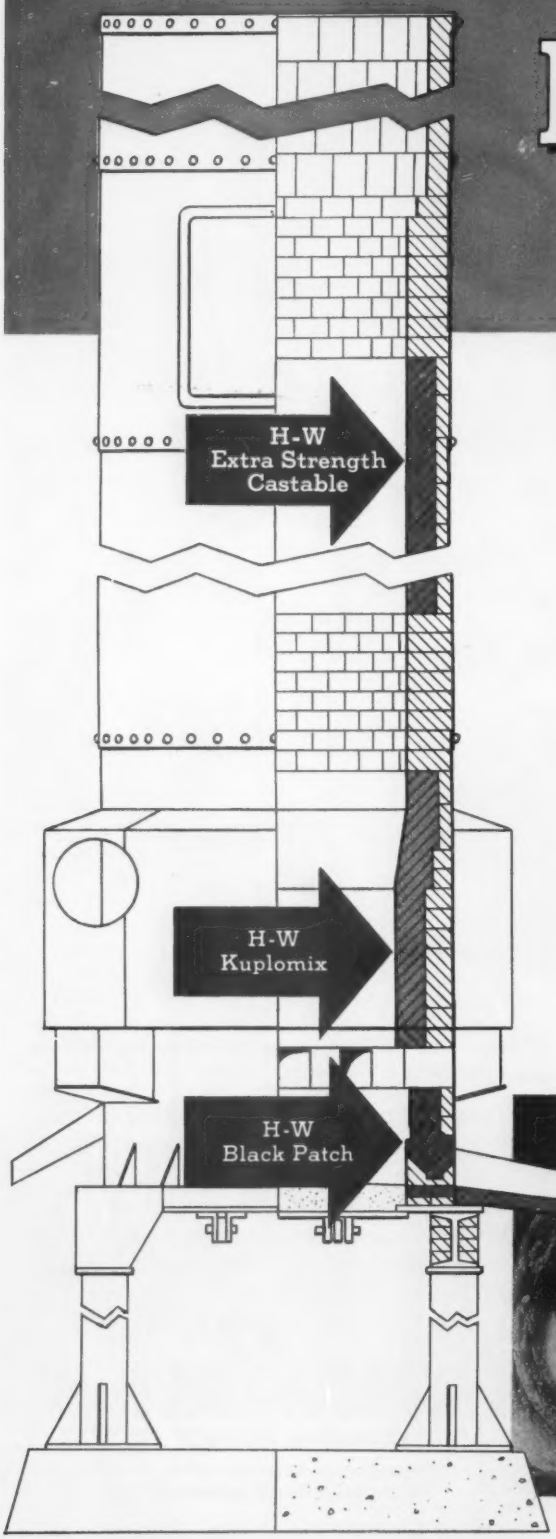
Grinding Wheels
A PRODUCTION-PROVED PRODUCT OF
THE CINCINNATI MILLING MACHINE CO.

°Trade Mark Reg. U. S. Pat. Off.

Circle 599 on Page 131

The complete range of Monolithic provides for



for CUPOLAS...

in the charging zone . . .

H-W EXTRA STRENGTH CASTABLE makes a hard strong refractory concrete lining which is extremely resistant to impact and abrasion. In refractoriness it is adequate for service at temperatures up to 2400°F.

in the melting zone . . .

H-W KUPLOMIX forms monolithic linings free from vulnerable joints. It is highly siliceous and very resistant to the corrosive action of non-basic slags and to erosion by molten metal and slag. Applied by air-placement guns or by ramming, it forms a strong lining which withstands impact and abrasion to a high degree.

in wells, tap holes and breast walls . . .

H-W BLACK PATCH is a plastic refractory made with super duty quality fire clay and graphite. When heated the monolithic lining formed with H-W BLACK PATCH develops a strong ceramic set and is highly resistant to wetting and penetration by molten iron and slags. Other applications in which H-W BLACK PATCH renders unusual service are for linings of spouts and runners of cupolas and ladles. Preformed shapes also are supplied.

Gunning Kuplomix

HARBISON-WALKER
Refractories
castables
plastics
ramming mixes
all foundry needs

for FURNACES . . .

Harbison-Walker plastic and castable refractories of various kinds most advantageously fulfill many different specific needs.

H-W 56 LIGHTWEIGHT CASTABLE (56 lbs. per cu. ft.) having relatively high strength commensurate with its excellent insulating value serves with very satisfactory results at temperatures up to 2000°F. Various lightweight insulating castables of exceedingly low iron content are furnished for particular controlled atmosphere furnaces.

H-W EXTRA STRENGTH CASTABLE is widely favored for car tops of annealing furnaces and for concrete linings which are required to withstand unavoidable mechanical abuse. It is dense and highly impervious to gases and fumes and yet possesses the property of low spalling tendency.

Furnace lining and car top are of castable refractory materials.

HARBISON-WALKER REFRACTORIES CO.
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World's Most Complete Refractories Service
General Offices: Pittsburgh 22, Pennsylvania

Circle 600 on Page 131

let's take a second look at air compressor costs

Let's look at what Joy compressors have to offer in saving you money where it counts the most. Let's assume that all compressors are competitively priced . . . and go on from there.

eagle-eye the installation first . . . here's where specifying Joy saves a bundle. Why? Because Joy stationary compressors are "Packaged" units. They're shipped complete, ready to run without tedious, costly site assembly. Joy compressors need as little as one-half as much foundation. You can save up to $1000 on that item alone.

plus savings in maintenance . . . *All the wearing parts:* the cylinder liners, cross head guides, valves, etc., are replaceable at your plant, by your men. This is a Joy exclusive. No specialists needed, no fancy tools required. Joy engineered these compressors to run for years on minimum maintenance.

and on operation, we'll let the people who have used Joy compressors for years do our telling for us. Nope—no modesty . . . but the money they've saved in operating costs annually would sound unbelievable coming from us.

If you're frowning over the choice of your next compressors and what to do to save a needed buck . . . . . .

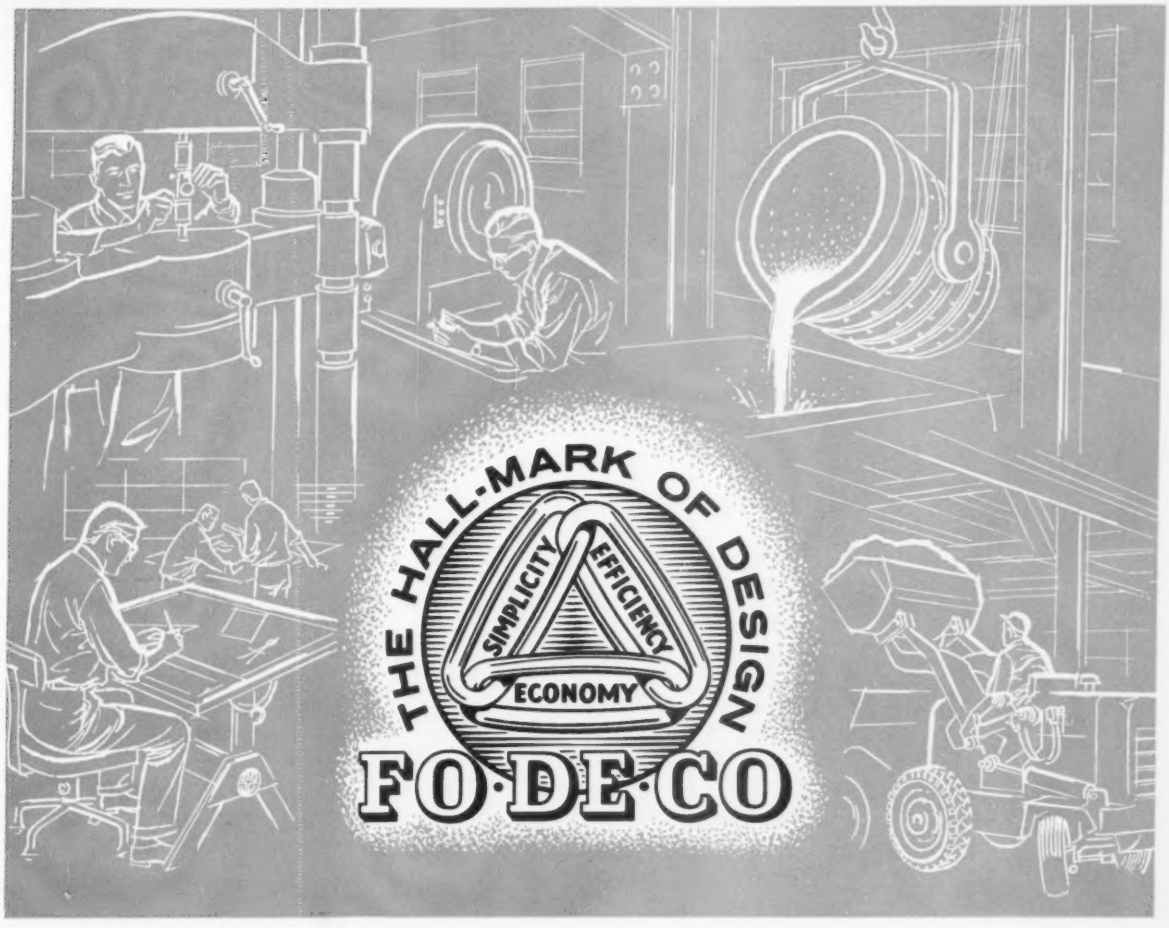
Take a second look and get in touch with a Joy Engineer. He'll show you how Joy saves you money on air. Write Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa. In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.

WSW 1 7165-243

WRITE FOR FREE BULLETIN 243-13

JOY SAVES YOU MONEY ON AIR

COMPRESSORS • FANS • DUST COLLECTORS



COMPLETE is the word for it!

A Time Tested (Since 1940) Foundry Planning and Engineering Service to Guide Management to PROFITABLE Operation.

As a Foundryman, you are doubtless aware of the industry's many hazards and its sensitivity to mechanical, human and economic elements.

EXPERIENCE and KNOWLEDGE are ESSENTIAL in a business of this type, particularly when new construction, modernization or expansion is planned.

FODECO's staff has been built to serve the foundry industry in ALL of its functions. Our programs are engineered by men who know foundries. We can help you with:

1. **Design and layout**
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Circle 602 on Page 131

FOR MORE PROFITABLE INDUSTRIAL SELLING

marketing with . .

. . two-way communication

Industrial selling is *tougher.*

But, in the face of this, top management is calling for more sales at a profit.

Better marketing—total marketing—is the answer to moving more goods within industry.

That is why so many industrial companies are bringing research, production, engineering, finance and advertising into the closest coordination with selling. Profit from every sale results when you coordinate capacity to sell and capacity to produce.

This concept of marketing demands a strong program of good communication—*two-way communication.*

Communication *from* your market, to tell you what products are wanted and needed.

Communication *to* your market, to make the extra contacts you need to help salesmen defeat the problems of group buying patterns and turn more *calls* into *sales.*

Good communication *from* the market depends on your sources of information. You'll find practical, helpful information in MACHINE DESIGN's "Geographical Analysis of the Original Equipment Market"; AUTOMATION's "Confidential File"; FOUNDRY's "Foundry Industry Marketing Guide"; STEEL magazine's new book "Metalworking Markets in the U.S."; N.E.D.'s "How to Get Industrial Buying Action".

Consult your Penton man. He's interested in helping you get the results management wants—more industrial sales at a profit.

the PENTON

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AUTOMATION / FOUNDRY / MACHINE DESIGN / NEW EQUIPMENT DIGEST / STEEL

STRENGTH

WHERE YOU NEED IT MOST!

- Solid rolled flange with full width bearing
- Sturdy all-steel web of 1/4" or 3/8" thickness
- Solid center reinforcing bar to resist torsional strains
- Sturdy all-steel web of 1/4" or 3/8" thickness
- Solid rolled flange with full width bearing

Sterling Heavy Duty Flasks in a large Midwest foundry

Sterling Heavy Duty Flasks enable you to meet the toughest foundry production schedules. That's because Sterlings are fabricated from hot rolled high carbon steel with copper bearing and welded into a single rigid unit. They have strength where stress is greatest . . . solid rolled flanges . . . thick all-steel webs . . . and reinforcing ribs welded around each section to resist torsional strains. Engineered for durability, Sterlings give you extra strength, with less weight, for easier handling. For complete foundry flask service — consult STERLING.

Sterling

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Subsidiary Company: STERLING FOUNDRY SPECIALTIES LTD.
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Manufacturers of Foundry Equipment for Almost a Half Century!

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Time To Dig

It's not too difficult to find support for the belief that castings are not gaining as many new markets as are some other forms of fabrication. The foundry industry held its own in the postwar years through 1951, but since then has lagged behind manufacturing as a whole in business volume growth.

Here's what the record shows. In the five years 1947-51, average industrial production—as measured by the Federal Reserve Board index—was 106.4 per cent of the 1947-49 average. On the same basis, the index for casting shipments was 106.5 and that for steel ingot production was 108. Through 1951, therefore, foundry activity almost exactly matched that of the average of all manufacturers. But there the similarity ends.

During the next five years—1952-56—shipments of castings had an index of 109.6, against 133 for all manufacturers. In 1957, the respective indexes were 106 and 143. For the first half of 1958 the castings index was down to 81, compared with 130 for the all-industry average.

Special circumstances, of course, have influenced the 1958 record; the business recession has hit hardest the industries which comprise the principal customers of foundries and primary metal producers. Actually, the decline in castings shipments from the 1957 level has been less than the drop in steel ingot production.

If we go back to the several pre-recession years, however, it is harder to explain the spread between activity of foundries and that of the steel industry and primary metal producers generally. From 1952 through 1957, the production index for primary metals averaged 128 and for steel ingots 127, compared with 109 for castings shipments.

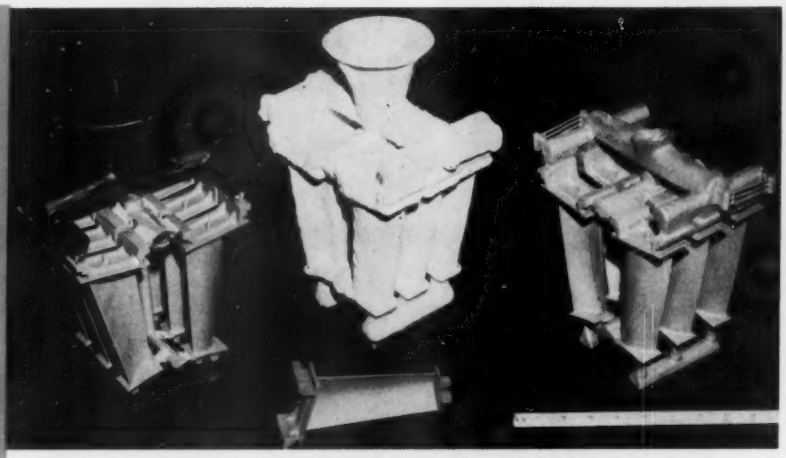
One of the principal inferences to be drawn from these figures is that importance of the marketing job facing the foundry industry has not been overemphasized. In fact, this task needs intensification and broadening in the attention now being given it by foundries and the foundry trade associations.

Foundries can count on receiving a large tonnage of business for certain applications where no adequate substitute is available. But only hard digging for new markets will develop the additional volume that is required if the industry is to realize its full potential.

William G. Reese

Managing Editor

Shells are examined after primary firing for evidence of defects



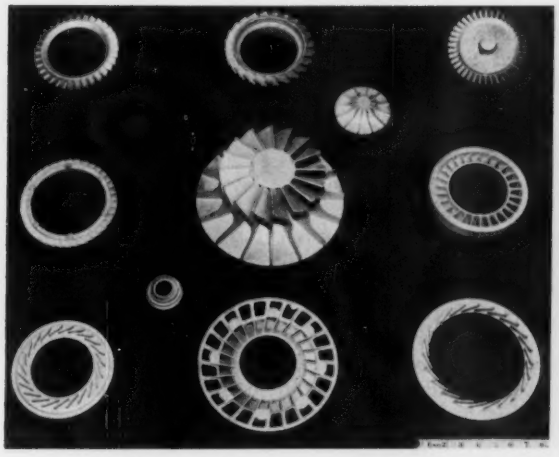
Pattern cluster is at left with 9-lb ceramic shell mold at top center and castings cluster at right. A single casting is at bottom center

Investment Casters Push

Ceramic Shell Use

Commercial production of castings in ceramic shell molds at this shop has shown a number of advantages over the use of investment molds. They are discussed in this article

By TED OPERHALL
President
Misco Precision Casting Co.
Whitehall, Mich.



Turbine nozzles, wheels, and inducers of various high-property alloys are cast in ceramic shells

Larger castings such as these stainless alloy aircraft valve bodies also are cast in shells

LATE in 1957 Misco Precision Casting Co. started commercial production of castings in monolithic ceramic shell molds. Mold materials used and production techniques were the outcome of development activities started about a year before.

Our shell process, which we have trademarked Mono-Shell, is one of many variations of the process under development in several investment foundries. We feel that ceramic shell molding will be a useful and practical system for producing castings, and will replace to a great extent the old massive monolithic type investment mold which we have used for the last 18 years. While we do not propose to say that the ceramic shell process will completely eliminate the conventional investment process, we are confident that it will play a predominant roll with investment casting companies in the future.

Mono-Shell, we feel, provides a host of advantages—in simplified raw material handling and mold storage, quality of casting, and, most importantly, cost—the most pertinent factor in maintaining a competitive position in our field.

The process produces castings considerably more intricate and larger than we have been able to produce heretofore. A major advantage is the ability to form a shell mold by a sequence of dipping operations, which precludes the need for flasks, vibration, and bulk investment. Furthermore, problems usually encountered with flat surfaces or cored areas which cause liquid entrapment, subsequent breakaway of the dipcoat, and scrap due to inclusions, finning, and other difficulties are minimized.

A cluster of turbine vanes now is produced in a shell weighing only 15 lb, as opposed to an investment mold weighing 70 lb. The cycle time for producing shells has been greatly minimized. The preheat cycle for conventional molds normally takes 16 to 18 hr, whereas shell preheating is accomplished in 1½ hr.

Casting techniques are similar to those for conventional investment, and shells may be poured under pressure without backup. The operations from shakeout to shipping are the same as for the conventional process. Significant improvements have resulted in surface quality and general cleanliness, however, with resulting reduction in finishing operations and scrap rates.

To give a picture of the advantages of Mono-Shell over the conventional process in our foundry in the matter of scrap reduction, we have developed a statistical summary of the third stage vane for the J-57 C engine. This scrap comparison was based on a quantity of more than 25,000 pieces produced by both processes and is shown in Table I.

TABLE I—Scrap Reduction on Blade Casting*

Operation	Conventional	Jan.-Apr. Mono-Shell	May Mono-Shell	Per Cent Reduction
Rough inspection	9.0%	5.7%	3.3%	63
Rough x-ray	0.6	0.01	0.02	97
Visual insp. No. 1 ...	4.6	4.6	4.2	9
Straighten & gage....	0.7	1.3	0.7	..
Visual insp. No. 2 ...	6.2	7.6	5.3	15
Final x-ray	1.5	0.8	0.05	97
Zyglo	12.5	7.2	5.0	60
Weighted over-all scrap, rough inspection through shipping ..	30.7%	24.4%	17.4%	43
Rework history, hours per piece	0.108	0.053	...	51

*Quantities studied—Conventional process, 28,954; Mono-Shell, 26,849.

Another important aspect of the shell process is the ease with which it can be incorporated into an existing investment foundry. The cost of equipment is small in relation to the savings and increase in capacity that can be provided. Our slip coat operation now is in an area which once was used for bulk storage of sand and grog used for our conventional process.

Before our ceramic shell process was developed, capacity was predicated on the number of molds that could be processed in a given day through a preheat furnace. This was the limiting factor due

to the very long preheat cycle that was necessary. In our foundry, three 40-ft continuous furnaces had a production capacity of 600 molds a day. The installation of our present shell process in the area used for storage provides capacity of 400 shells a day, and we still have daily capacity for 300 conventional molds. If the entire facilities at Whitehall were converted to shell, it is expected that capacity could reach 800 to 900 molds a day.

The rate of transition to shell production is determined to a large extent by the rapidity with which tooling can be changed. This is due primarily to the shrinkage differential of each of the processes.

All our production jobs currently are being shifted to this process, and today 40 per cent of production at the Whitehall plant is in Mono-Shell. By October, we expect to be operating at 80 per cent. Our Muskegon operation is being committed entirely to Mono-Shell, and production is expected to start shortly at the rate of 250 shells a day. Capacity at Muskegon is geared to a level of 400 shells; supporting facilities, however, have capabilities of processing 800 shells a day.

While we are a strong proponent of ceramic shell molding, we do not feel that it is a cure-all and the answer to all investment casters' problems. One of the basic factors which must be appraised in light of the unbacked shell is the gating system. New techniques are required, because external down-runners and gates create unusual solidification patterns, resulting in problems that need to be resolved to render the castings metallurgically sound.

One advantage, which we had not anticipated, relates to the unusual stability of our shells in conjunction with many of the superalloys containing titanium and aluminum. Alloys such as CF 240, Udimet 500 and 700, and GMR 235, when poured in conventional investment usually develop surface oxide stringers. These are not in evidence with Mono-Shell.

Another important achievement is improvement in physical properties of many of the alloys. In many instances stress rupture life has been doubled because of rapid solidification in the unbacked shell. This, of course, is a definite plus factor when dealing with highly stressed components in the turbine section.

We fully expect that the general transition to shell processes will come about within the next year or two in one form or another. While we do not believe that our practice answers all the questions and problems which we have in day-to-day castings production, it represents a significant improvement over our conventional process.

This paper was presented at the Investment Casting Institute spring technical session June 23-25, 1958 in Muskegon, Mich.

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Inspected, approved shells are given final coating, sprues covered to prevent entry of dirt, and placed on racks ready for preheating and pouring

Steel Castings for
RADIOACTIVE SERVICE

Experience in the purchase and inspection of steel castings for radioactive system service is reflected in the latest revision in specifications covering these products

By GEORGE SORKIN
Metallurgist, Bureau of Ships
Department of the Navy, Washington

FOUR nuclear-powered submarines have been built and many other nuclear-powered ships authorized since the Bureau of Ships issued MIL-S-18262(SHIPS) on Nov. 10, 1954.

That specification, the first military specification for corrosion-resistant steel castings for radioactive system service, was issued at a time when designers of nuclear power plants were still reluctant to use castings in critical applications. As a matter of record, the *USS Nautilus* used wrought material exclusively. More than three years of experience now has been accumulated in the purchase and inspection of steel castings for radioactive system service. The current revision, MIL-S-18262A(SHIPS), dated Feb. 7, 1958, reflects that experience.

The specification has been redrafted to cover primarily finish-machined castings, although it may be used for ordering castings to be subsequently machined or otherwise finished.

Table I shows that the alloys covered by the specification are not usual except for limitations on cobalt (and tantalum for stabilized grades). Restrictions on these elements are necessary because of radiation hazards. Table II gives the required mechanical properties for the four alloys covered. These requirements have been made more restrictive in that an extensometer must be used to determine yield strength while dividers were acceptable in the original specification.

Quality Defined—By far, most challenging requirements of the specification are in its quality assurance provisions. An attempt has been made to reduce the inspection required as well as to define acceptable quality more accurately. Much of the data used as a basis for modification of the specification resulted from investigations and discussions conducted by Bureau of Ships, Westinghouse Atomic Power Division, Knolls Atomic Power Laboratory, and major producers of quality corrosion-resistant steel castings.

The castings purchased under MIL-S-18262A (SHIPS) must be suitable for prolonged service handling approximately 2000 psi high-temperature water. Castings are in an all-welded installation which allows no normal preventive maintenance inspection. Castings are subjected to thermal cycling and pressure cycling as well as nozzle pipe stress, mechanical shock, and bending moments. It can thus be seen

TABLE I—Chemical Composition of Castings

Class	C (max) Per cent	P (max) Per cent	S (max) Per cent	Cr Per cent	Ni Per cent	Mn (max) Per cent	Si (max) Per cent	Mo Per cent	Cb Per cent	Ta (max) Per cent	Co[1] (max) Per cent
I	0.08	0.045	0.045	18.0–21.0	8.0–11.0	1.50	2.00	.....	.....	...	0.20
II	.08	.045	.045	18.0–21.0	9.0–12.0	1.50	2.00	.....	8×C–[2]0.85	0.10	.20
III	.08	.045	.045	18.0–21.0	9.0–12.0	1.50	2.00	2.0–3.0	.....	...	.20
IV	.08	.045	.035	22.0–26.0	12.0–15.0	1.50	2.00	.....	10×C–[2]1.00	0.10	.20

[1]Unless otherwise specified in the contract or order. [2]Numerical value is maximum.

TABLE II—Mechanical Properties

Class	Tensile strength (minimum)	Yield strength[1] (minimum)	Elongation in 2 in. (minimum)
I	70,000 psi	28,000 psi	35%
II	70,000	30,000	30
III	70,000	30,000	30
IV	70,000	28,000	30

[1]Yield strength shall be determined by using the 0.2 per cent offset method or by a total extension under load of 0.3 per cent using an extensometer reading to 0.0001 in. per in.

TABLE III—Size and Number of Indications

Size of Indications, Inches		Number per square inch
Dye Penetrant	Fluorescent Penetrant	
>[1]1/8	>1/16	None
> 1/16 ≤[1]1/8	>1/32 ≤1/16	2
≤[1]1/16	≤1/32	10

[1]Diameter of bleed-out area.

that the Navy has sound reasons for insisting on high quality for the castings.

Kanter, in his paper presented during the 1957 Nuclear Congress in Philadelphia, discussed quality requirements for steel valves for nuclear power plants. He concluded that "any kind of stress-raiser in a metal section may be suspect as a source of eventual deterioration of a component that is subjected to frequent thermal cycling, as may be the case in primary loop piping. Hence, forgings containing flakes, castings with hot tears, heat-affected weld zones with micro-fissures, weldments with incomplete penetration, as well as designs with sharp changes in section or other sources of stress concentration, are all suspect in this type of service." While the specification cannot eliminate design problems, it does attempt to minimize metallurgical difficulties.

Testing Requirements—In addition to exacting requirements for cleaning, heat treatment, and resistance to intergranular corrosion, nondestructive testing by radiography, liquid penetrant examination, and hydrostatic tests are required. When specified, pressure-containing castings on which installation welding is to be performed are required to pass a weldability test.

The pertinent requirements for radiographic examination acceptability are "the maximum acceptable amount of any type of radiographically-revealed defects in a casting shall be as shown in Bureau of Ships Radiographic Standards for Steel Castings. Class I of the radiographic standards shall apply for wall thicknesses of 1 inch or less, and Class II shall apply for wall thicknesses greater than 1 inch."

In addition, repair welds must conform to the more restrictive requirements of NAVSHIPS 250-692-2, Group 1. The decision to use Class II standards for sections over 1 inch was arrived at after much discussion. The expense and difficulty of reworking castings to meet Class I, while a factor, was only one of the considerations. Defects within the limits of the standards confined to the deep interior of the casting are considered acceptable. Surface defects will be found by other nondestructive tests.

Identified Casting Series—To reduce the cost of radiographic examination, where possible, the specification introduces the concept of "identified casting series." The provisions of the specification regarding the reduced inspection for an identified series are given below:

Establishment of an identified casting series—An identified casting series, to qualify for a modified radiographic examination schedule, may be established as follows:

Designation of critical areas—The purchaser shall supply the foundry with a drawing designating the highly stressed areas in the casting based on the design and service requirements. All the metal within 3 inches of all welding ends shall be marked on this drawing. In addition, the foundry shall mark on this drawing those other areas where defects in excess of the radiographic standards can be anticipated due to casting practice. All of the foregoing areas shall be defined as critical areas. A drawing showing these areas shall be submitted to the bureau or agency concerned prior to any production casting.

Casting procedure—The casting procedure to be employed in an identified casting series shall be recorded by the producer and properly identified and dated by the Government inspector or agent of the bureau or agency concerned, and shall be retained in file by the casting producer for reference only. Casting process details such as core and molding materials and preparation, gating, risering, venting and padding, the amount of metal poured, the pouring temperature range, and the method of temperature measurement shall be included in this procedure.

Verification of critical foundry areas—An identified casting series will be considered to have been established if, after the casting practice to be followed in production casting has been established, radiographic examination of 100 per cent of the volume of metal in the first six castings verifies that the defect location pattern is within the critical foundry areas designated on the drawings submitted under the provisions above, or if the designation of the critical foundry areas is appropriately modified to include those other areas in which defects in excess of the radiographic standards have been found.

Radiographing a large volute case for nuclear power plant with 24-million volt betatron at Electric Steel Foundry Co., Portland, Oreg.

Deviation from casting practice of an identified series—Radiographic examination shall be made on 100 per cent of the volume of metal in a casting produced by a casting practice which unintentionally deviates in any detail from that established for an identified series. The casting produced shall not be considered to be one of the identified series and shall not be so marked. The radiographic examination of 100 per cent of the volume of metal in the casting shall not be considered as fulfilling such a requirement for each of the first six in verifying the adequacy of the designated critical foundry areas, or the requirement for radiograph of 100 per cent of the volume of each numerical fifth production casting thereafter.

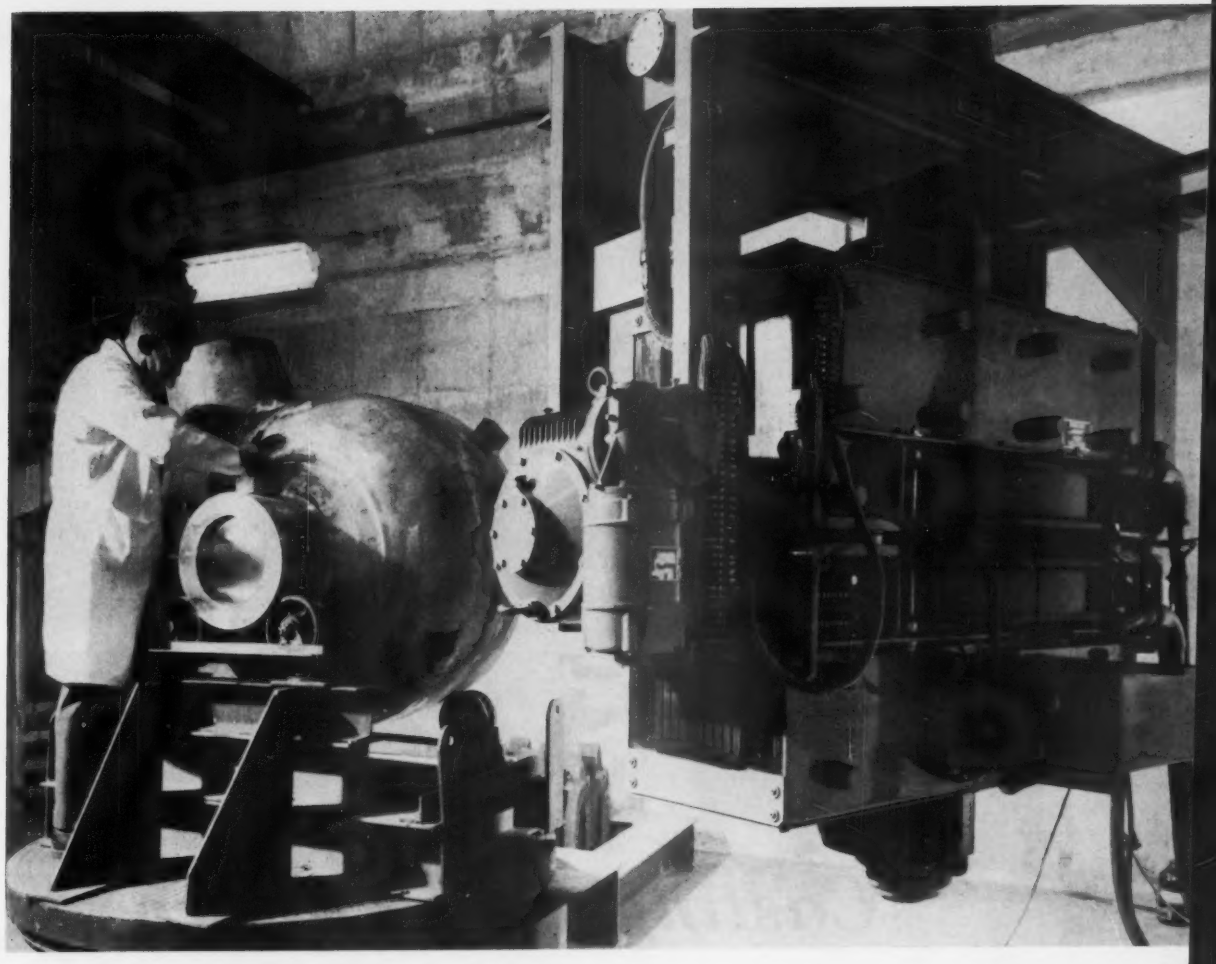
Change in casting practice—A new identified series shall be established if the casting practice for a given casting design is modified in any detail. A new identified series shall be established if the design of the casting is modified in any detail.

Radiographic examination schedule for identified series—Castings subsequently produced in an identified casting series shall be radiographed only in the critical areas except that every numerical fifth casting shall be radiographed for 100 per cent of its volume. By mutual agreement, a casting other than the numerical fifth may be chosen to represent that group of five.

For castings of an identified series produced after a lapse of more than 1 year, the identified series shall be reverified by 100 per cent radiographic examination of the first three castings. Examination of production castings shall then continue in accordance with paragraph above.

Identification of castings within identified series — Each casting produced as a part of the series shall be identified with that series by a suitable means. This identification shall apply only if the established identified series casting practice details are followed in total.

Defects in other than critical areas—When 100 per cent



radiography of the one casting in five in an identified casting series reveals a defect in excess of the radiographic standards, and this defect is in a location other than those designated as critical areas the purchaser may require that the four other castings in that group be radiographically examined in that location.

Penetrant Examination—All surfaces of finish machined castings, including as-cast surfaces or repair welded surfaces constituting a part of the finish machined casting, are required to be penetrant examined. The acceptance standards are as follows:

(a) All surfaces shall be free of cracks, tears, or porosity which is disposed linearly so as to promote formation of a crack or other continuous type of defect under stress. In linearly disposed porosity, the average of the center-to-center distances between any one indication and the two adjacent indications shall be not less than 3/16 inch.

(b) Weld faces and exterior surfaces of welding ends prepared for field welding shall, in addition, be free of random indications in excess of the following for a distance extending not less than 2 inches from the edge of the joint preparation. Surfaces constituting a part of the finished casting and which will be involved in the inspection of shop welds shall be free of random indications in excess of that shown in Table III for a distance of not less than 1 inch on each side of the preparation.

Repair welding—All repair welds and the adjacent base metal shall be inspected in accordance with the specification and shall comply with the requirements of (a) above. For weld metal which will not subsequently be radiographically examined, the number of random indications shall not exceed six in any 6-inch length of weld, the sum of the diameters of the indications shall not exceed 3/16 inch for dye penetrant and in no case shall any dye penetrant indication exceed 1/16 inch or any fluorescent penetrant indication exceed 1/32 inch. Indications of pinpoint porosity (that is indications less than 1/64-inch diameter) may be permitted if well dispersed, and if the pattern formed does not indicate that they are linearly disposed so as to promote formation of a crack or other continuous defect under stress.

Certain Repairs Forbidden—The specification goes into considerable detail on the removal and repair of defects. This was found necessary because the subject was one of the most controversial aspects of the previous issue of the specification. Repair by welding is allowed, but peening, plugging, or impregnation to stop leaks or to obscure surface defects are not allowed.

For those interested in the complete specification, copies are available from the Commanding Officer, Naval Supply Depot, Scotia 2, New York. Requests should state both title and identifying number.

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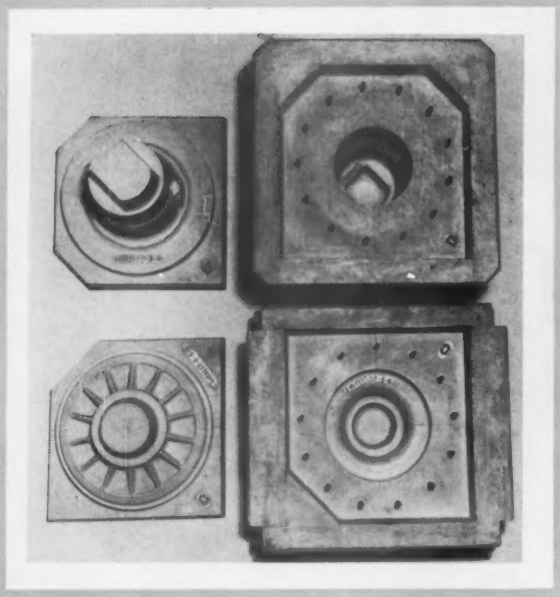
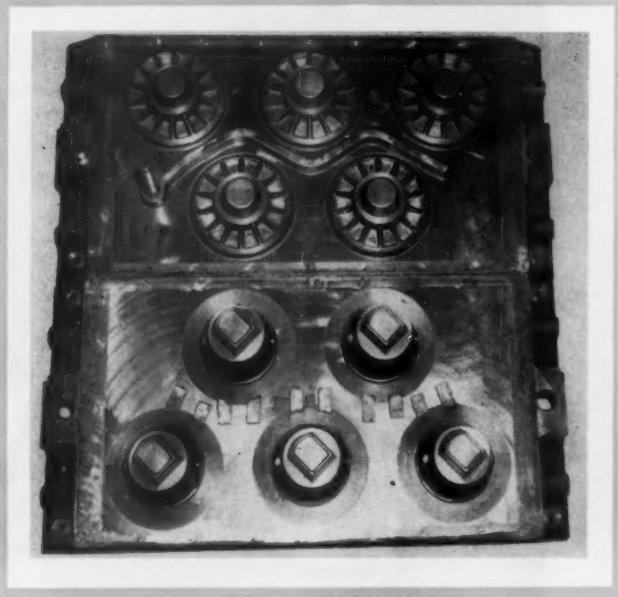


Master patterns for differential case and the lightner coreboxes used to make the patterns



Elimination of contour machining makes these patterns well suited to zircon sand molding

Casting Iron Patterns in

Various properties of zircon sand make this mold material desirable for use in casting iron production patterns. Reduced machining not only cuts costs but leaves the pattern with a good wearing surface

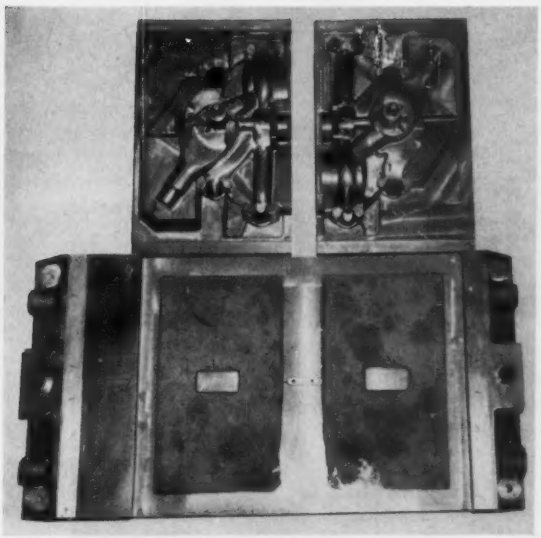
By C. W. YAW
Assistant Foundry Superintendent
Cadillac Motor Car Div., General Motors Corp.
Detroit

IRON production patterns cast in zircon-sand-faced molds at Cadillac Motor Car Div. of General Motors Corp., Detroit, offer a number of advantages.

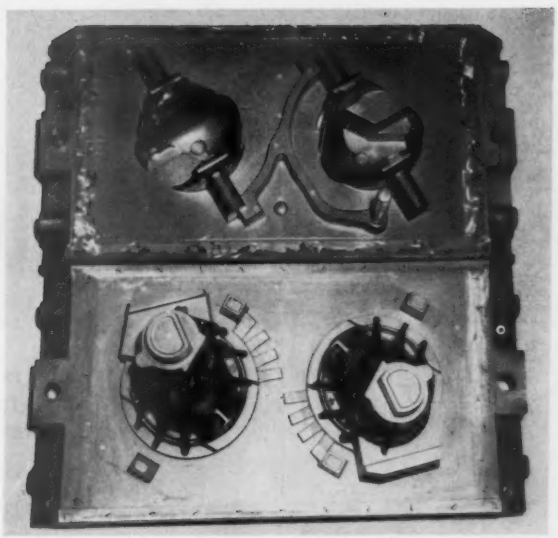
1. As-cast tolerances are such that machining is minimized, resulting in low pattern cost. 2. Pattern wearability is good because the natural hard cast iron skin of the pattern is not removed by machining. 3. Replacement cost of these production patterns is low since most of the cost entailed in this type of pattern is in making the original master pattern from which the production duplicates are made. 4. Pattern maintenance cost is reduced because making a new pattern often is easier than repairing a damaged one.

Zircon sand has a number of properties which influenced the decision to use it as a mold material for production patterns. It has about twice the heat conductivity and twice the density of silica sand. Thus it can absorb twice the amount of heat in half the time as compared with silica sand. Zircon sand has a fusion point of about 4000° F; the fusion point of silica sand is about 3250° F. The properties of high refractoriness, heat conductivity, and density with low expansion were considered desirable for producing iron patterns.

Molding Procedure—The same sand mix is used for molds and cores since both are baked, and the iron is poured exclusively in dry sand. This is the mix employed:



These patterns for a water pump are completed, ready for installation into cast iron plates



Patterns similar to these rather complicated ones have been run two years without repairs

Zircon Sand

	Weight in Pounds	Per Cent by Weight
Zircon sand	300.0	93.8
Iron oxide	6.0	1.9
Water (2 qt)	4.2	1.3
Core Oil (1¾ qt) ...	3.5	1.1
Cereal	2.5	0.8
Clay	2.0	0.6
Drier	1.5	0.5
	319.7	100.0

The mulling cycle is 2 minutes for material in the dry state, 4 minutes after water is added, and 2 minutes after addition of the oil.

Prepared sand is riddled over the master mahogany pattern, which is built to a shrink rule of ¼ in. per ft, or into a corebox and hand-rammed to a uniform thickness of at least 2 in. For large mold or core sections the zircon sand is backed up with a regular core sand mix. The mold is hand-vented carefully. Extensive use is made of pencil gates to allow iron to enter the mold as fast as possible.

Molds and cores are baked at 375° F for 1 hr for each inch of thickness. It is better to overbake than underbake. The molds are poured with GMC's 12-M iron containing additions of 0.60 Ni and 0.20 Cr. Pouring temperature is 2500° F; too high a temperature will cause burn-in and create additional cleaning costs.

Pattern Finishing—Poured castings are slow-cooled in the mold to assure an even cooling rate and to reduce chances of warping or creation of internal strains in the castings. The zircon sand mold facing provides a smooth casting surface which requires only sanding with emery cloth to provide the desired pattern finish. A machining allowance of 0.005 in. of metal is provided on core prints and locating spots. These are machined to an accuracy of ±0.002 in. on the finished pattern.

Pattern halves are cast on a base ranging in thickness from ¼ to ½ in., depending on size of the pattern. The base is machined to fit a machined pocket in the pattern plate. This method of construction accurately locates the pattern on the plate, preventing any shifting. Also, sand can not get between the pattern and the plate. These features contribute to improvement in casting quality.

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A Brass Foundry Can Have . . .

Good Working Conditions

An efficient ventilation system is combined with a minimum of manual handling to provide the basis for desirable working conditions at the brass foundry of the Ford Meter Box Co., Wabash, Ind.

By WILLIAM G. GUDE
Managing Editor

WHETHER working conditions in a brass foundry are good or bad depends largely on two factors: 1. The efficiency of its ventilation system. 2. The extent to which manual handling of sand, metal, and molds is eliminated.

On both of these scores the Ford Meter Box Co., Wabash, Ind., ranks high. A leading manufacturer of water meter setting equipment, Ford operates its own foundry for the production of the many brass castings it requires as components of these meter fittings. The most noticeable feature of its foundry is the general absence of smoke, noxious fumes, and dust around the normally troublesome melting, pouring, and shakeout areas. An advanced state of mechanical handling also has been achieved, aided by use of a number of devices of the company's own design.

Sand preparation, molding, melting, pouring, and shakeout operations are carried on in a 66 x 136-ft area, a little more than one-fifth of which is occupied by the melting department. Coreroom and the casting cleaning department are situated in an adjoining section of the building.

Central Sand System—As indicated by the accompanying layout sketch, molding sand is prepared in one corner of the foundry and distributed by conveyor belt to overhead hoppers at the molding stations. These hoppers are equipped with level indicators which automatically maintain an adequate sand supply. The molding sand system contains about 40 tons of a mixture of two parts lake sand and one part natural sand containing 17 per cent clay. It is prepared in a 1500-lb capacity muller, and the mixture averages 3 per cent moisture, 33 permeability, and 11 psi green strength.

Molds are made on jolt-squeeze machines. Six machines are used for production molding with matchplates and two handle loose pattern work. Molds are made in tight flasks of 12 x 14, 12 x 16, and 14 x 13 in. sizes. Approximately 500 different patterns are in regular production. Molding schedules are on a basis of 35 hours a week for a total output of about 33,000 lb of finished castings ranging up to 2 lb in weight.

As each mold is completed, the machine operator sets it on a pallet which is elevated to a convenient height in front of his machine. The pallet, fitted with wheels, accommodates six molds, and when filled is rolled by gravity over rails to the pouring station. The latter is a raised platform extending across the mold conveying rails, and has an overhead monorail leading from the melting department for the transport of molten metal.

Melting Operations—Melting facilities consist of three rocking-type, indirect-arc electric furnaces. One unit has 700-lb capacity but ordinarily receives a 400-lb charge. The other two have 350-lb capacity each. The furnaces are top-charged from a platform in back of them, where ingot and home scrap—provided by foundry returns and the plant's machining operations—are stocked for immediate requirements. Metal for all of the brass castings is 85-5-5-5 composition.

A simple device speeds up the charging of borings and gates. It consists of a trough with a hinged bottom which is mounted on a dolly. With a load of scrap it is wheeled up to the charging door, the bottom is opened and the contents drop into the furnace.

Smoke and fumes in the melting department are controlled effectively by trapping them where they are generated and exhausting them from the room through ducts. Fig. 1 shows how this is accomplished. An exhaust hood covers the top half of each furnace. When metal is tapped, much of the smoke and fumes is drawn out through this hood. The remainder of the contaminants are pulled out through an exhaust pipe and side hood

Showing arrangement of the sand preparation, molding, charging, melting, and shakeout in brass foundry's main 66 x 136-ft area

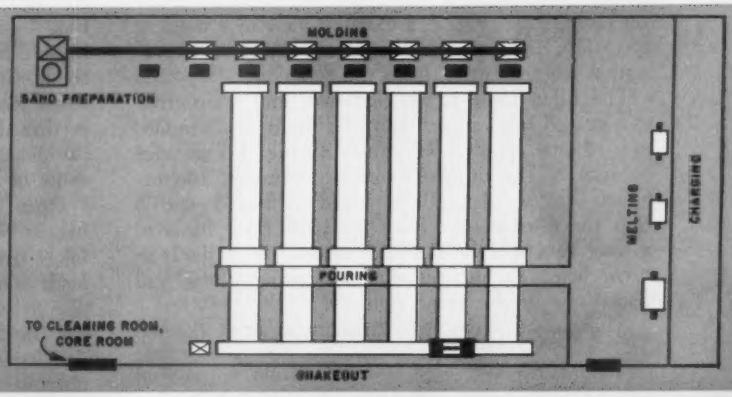

Fig. 1—Tapping one of three electric furnaces. Exhaust hoods over top of furnace and at side of receiving ladle trap and remove smoke and fumes

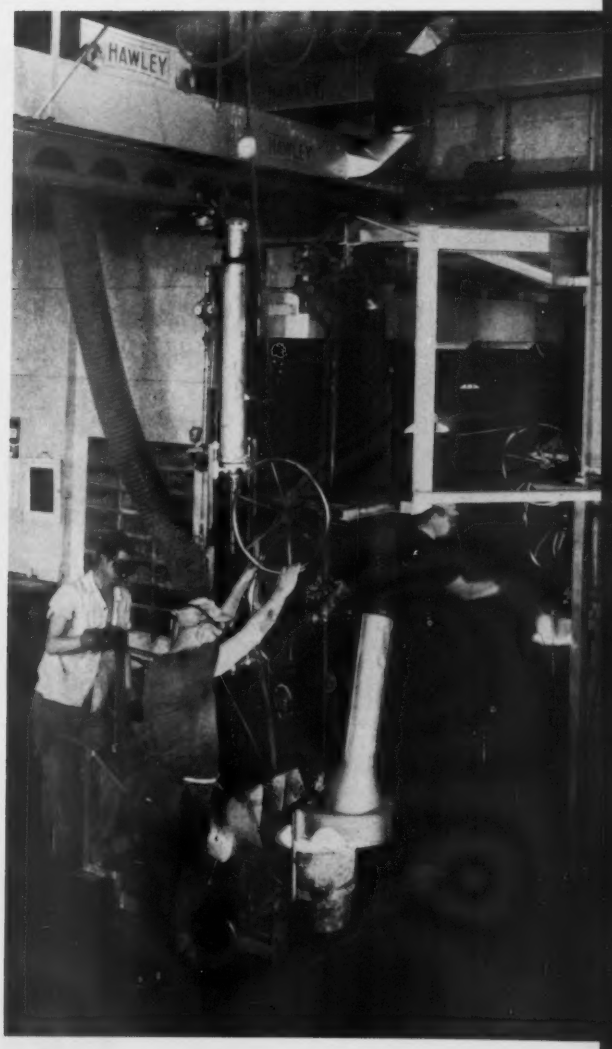

Fig. 3—Filled ladle being transferred to monorail hoist for delivery to the mold pouring platform

Fig. 2—Close-up view of tapping operation shows how fumes are prevented from escaping into room

fitted to a carriage on which a 250-lb-capacity pouring ladle rests. Fig. 2, a close-up view of a tapping operation, indicates how well the fumes are prevented from escaping from the room.

The filled ladle is wheeled over and transferred to a geared hoist suspended from the pouring monorail. Fume removal continues during this transfer because of the unique mobility feature of the exhaust system. It will be noted in Fig. 1 and 3 that the flexible tube from the ladle hood leads to a duct mounted on a bridge crane. This duct, in turn, leads to another duct extending along and above one of the crane rails.

These ducts have only three metal sides, the top containing a special belt and track, as shown in Fig. 4. A so-called "transition box," to which the flexible tube is attached, can be moved along this track. It has three rollers positioned in such a way as to leave an opening to the duct when the belt is threaded through them. In Fig. 4 the top of the box in the foreground has been removed to show how the belt passes around the rollers.

Once the ladle has been transferred to the pouring carrier, a collector hood attached to the bail takes over the job of fume disposal. This hood leads via a flexible tube—which permits a 360-degree turning radius—to an exhaust duct extending the length of the pouring platform. It is similar to the exhaust system in the melting department.

Metal temperature is checked by a pyrometer before each ladle leaves the melting room. Temperatures at which different molds are to be poured —ranging from 1950° to 2300° F—are posted prominently to guide the pourers before they move the ladle over the monorail to the pouring platform. Normally two men pour molds, each with his own ladle.

Mold Pouring—When a pallet load of six molds is to be poured, it is raised from the rails by a pneumatic cylinder attached to a framework

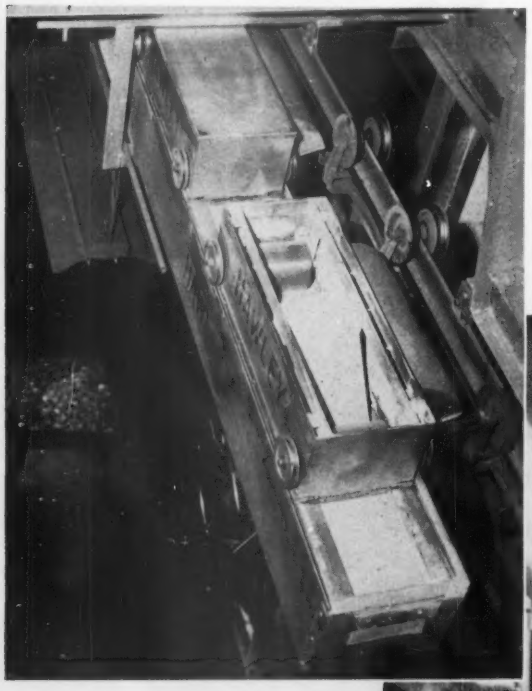

Fig. 4—Mobility is provided to exhaust ducts by a traveling box. Top of box in foreground removed to show arrangement of belt seal

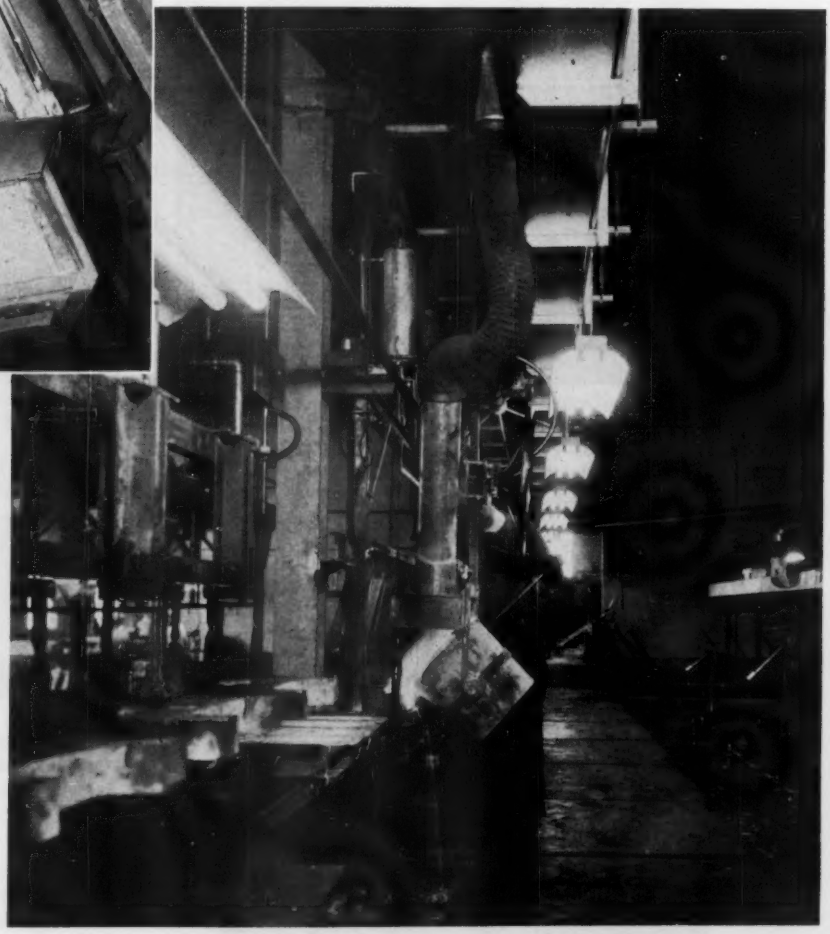

Fig. 5—Pneumatic cylinder raises molds under suspended weights for pouring at a convenient height

into which the pallet rolls. This elevates the molds to a convenient pouring height and brings them up under suspended weights, as shown in Fig. 5. The close-up view of a mold being poured (Fig. 6) shows how effectively the fumes from the molten metal are trapped.

After the six molds are poured, they are lowered back onto the rails, which are set flush with the pouring platform, and moved off to a cooling area preparatory to the shaking out of the molds. The pourer then proceeds to the next group of six molds.

Shakeout—Poured molds cool for 10 to 15 minutes while they travel by gravity over rails to the shakeout line. This line, positioned at right angles to the mold conveying rails, consists of a vibratory conveyor and an unusual type of shakeout device (Fig. 7). Resembling somewhat a tumbling mill, the shakeout is fitted with wheels and is moved over rails straddling the conveyor. When it has been positioned before a group of six molds, two movable rails are lowered which permit the pallet and molds to roll into the shakeout. The device is rotated, and oscillation of the conveyor vibrates the flasks and causes sand and castings to drop quickly onto the conveyor trough.

At the end of the conveyor the castings are picked off by hand and deposited in tote boxes for transfer by lift truck to the cleaning room. Sand drops through a grid and is returned by belt conveyor under the floor to the sand preparation station.

As may be seen in Fig. 7, the shakeout employs the same type exhaust unit that is used elsewhere in the foundry. In this application both smoke and fines are removed and piped to a dust collector.

After a group of flasks has been shaken out, the operator ejects them from the side of the shakeout onto the return conveyor rails. These rails dip below the approaching molds and pouring platform, permitting the pallet and flasks to end up at floor level in front of a molding station. There they are raised pneumatically to the upper rails' height, and the production cycle is repeated.

Meanwhile castings trucked to the cleaning room are loaded into an airless blast barrel, next are sheared from the gates, and finally are ground where necessary before being transported to the machine shop.

Coremaking—Sand used in the coreblowers is a mixture of the same two sands used in the molding operation. This practice eliminates possible contamination of the molding sand by coarse grained core sand. All cores are baked in a gas-fired batch type oven.

Cost Savings—Because the foundry's ventilation system exhausts a relatively small volume of air, the expense of heating compensating air during cold weather is minimized. This saving, the company believes, is secondary to the many benefits it derives from enabling employees to work without the presence of zinc and lead oxide fumes. It feels that the combination of clean air and mechanized material handling is the answer to the problem of how working conditions in the brass shop can be made among the best in the foundry industry.

Ford's ventilation system and much of its handling equipment were originated by Harry C. Hawley, formerly its plant superintendent and now head of the Hawley Mfg. Co., Wabash, Ind.

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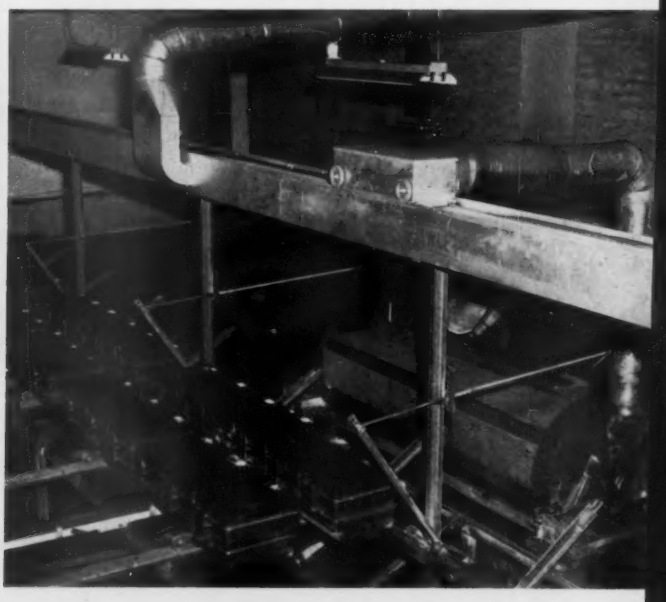
Fig. 6—Exhaust hood effectively traps fumes being given off during the pouring operation

Fig. 7—Enclosed shakeout device, which travels on rails over conveyor, exhausts dust and smoke



Quality Control Tests In the Shell Process

Checking the physical characteristics of shell molded castings and sand mixes can be simplified by use of a standard pattern to produce test castings and molds for making sand specimens

By EARL W. JAHN
President, Shell Process Inc.
West Springfield, Mass.

MORE and more castings are being designed for production in shell molds. As a simple check in the process of producing quality castings, physical testing is an important step in determining whether the castings will meet the buyers' specifications.

To assist in maintaining quality control, Production Pattern & Foundry Co., Chicopee, Mass., and Shell Process Inc., West Springfield, Mass., have developed a standard pattern (Fig. 1) for producing shell molded test specimens. The physical tests are inexpensive to make and, when made in conjunction with frequent chemical analyses, give a comprehensive picture of heats. This simple and practical method of physical testing enables the smallest shell molding foundry to practice quality control and produce accurate and sound castings with minimum scrap, and at a very small cost.

Conduct of these tests follows a routine pattern of daily checks. Because of the low moisture pick-up of shell molds, test specimen molds can be stored to be poured off when convenient. A few simple rules must be followed to produce specimens that will give useable results.

Considerable care should be taken when test specimen shell molds are being poured, because casting imperfections will make the results worthless. The sprue and strainer assembly, combined with the lap gate on the test specimen pattern, minimizes the possibility of dirt or slag entering the mold and meters the metal entering the test specimens, thereby tending to produce clean, sound castings.

When making transverse tests, the test bars should be tested in the same relative position; that is, with the same side uppermost in the testing machine. This is of the utmost importance, because the specimen pattern is gated for horizontal pouring and different readings will be obtained when the specimen's position is rotated.

Another precaution: If tumbling is used to clean castings, specimens should be cleaned similarly. Tumbling of specimens increases strength of bars by 100 to 300 pounds.

Concentricity Ring—The concentricity ring (Fig. 2) is used to determine the shrinkage and uniformity of diameters. Although these data add very little to analysis of heats, they aid in determining the proper shrinkage and metal allowance when designing pattern equipment.

K. Test Bar—This test bar specimen (Fig. 3) is invaluable in determining whether or not the heat has a tendency to produce internal shrinkage or porosity. The cast K bar is fractured through the center; if the mixture has a tendency to produce porous castings, the defect will be plainly visible.

Standard Test Bar—The standard $\frac{7}{8}$-in.-diam test bar is one of the more important physical tests made to determine transverse and tensile strengths of heats. It is usual practice to cast a pair of bars during the first half-hour of the heat and at 3-hour intervals, with the last bar made during the last hour of the heat.

The transverse test usually is performed on the $\frac{7}{8}$-in. standard test bar, recording the breaking load in pounds and the deflection in hundredths of an inch. The broken bars can then be drilled for chemical analysis or used for tensile tests. When tensile tests are desirable, the broken transverse test bars are machined to diameters of 0.505 and 0.800 in. and lengths of 3.75, 4.00, and 6.375 in. Only occasional tensile tests are made due to the added expense of machining each bar.

Linear Shrinkage—The contraction test is useful in estimating the shrinkage properties of any metal to be used in making patterns. This is a simple test which compares the final length of the cast bar (Fig. 5) with the original 12-in. pattern length.

Chilling Tendencies — The step bar specimen (Fig. 6) is used to study the difference of section sizes and chilling tendencies of any iron. This test is useful when castings require pressure soundness. Daily tests serve to control hardness, and when the step bar is broken longitudinally a study of the chilling effect on different sections and the

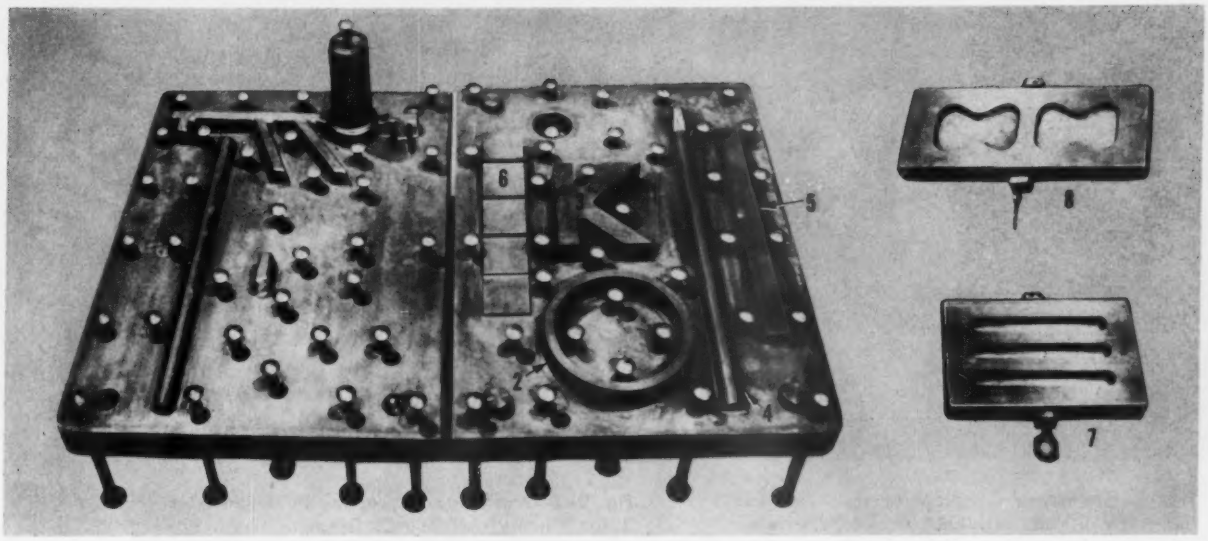


Fig. 1—Pattern (left) for producing shell molded test specimens. Molds (right) are used to prepare specimens for testing resin-sand mixtures. 2—Concentricity ring. 3—K test bar. 4—Standard test bar. 5—Contraction test bar. 6—Step bar specimen. 7—Flexural test mold. 8—Tensile test mold

structure of the metal can be made. Readings from each step give a good idea of hardness of corresponding metal sections of castings. When a hardness reading is taken, the spot to be tested must be ground flat and beneath the cast surface skin. The frequency and importance of hardness tests depend on the nature and class of castings produced.

Testing Resin Sand Mixtures—After having established the most suitable sand mix, based on the individual foundry's experience, it is important to have controls as a means of maintaining a consistent mix. An excellent and simple method is by making periodic tests of flexural and tensile qualities of the material being supplied to the shell molding or coremaking machine.

The testing is done by use of two specimen molds, one shown in Fig. 7 for flexural tests and the other shown in Fig. 8 for tensile tests.

Flexural Tests—The flexural test mold is made from gray iron and is used by heating it in an oven to approximately 400-425° F. The actual test pieces are made by filling the three mold cavities to overflowing and striking off the excess quickly with a straight edge. The mold then is cured in an oven at a temperature of approximately 800° F for two minutes.

After curing, the pieces are removed from the mold and should measure 5 x ½ x ½ in. The top surfaces of the bars not in contact with the mold surface will be rougher from the strike-off operation, and since flexural strength depends on reasonably accurate cross sections, it is common practice to grind this surface to a set dimension with a grinding wheel. Each piece next is cut in half, producing a bar with approximate dimensions of 2½ x ½ x ⅜ in.

The bars then are ready for testing in a flexural testing unit. To assure uniform test results, caution should be taken to place the bars in the tester so that the position of the face will be the same for each bar tested.

Tensile Testing—Tensile test specimens are prepared in the same manner as the flexural test bars. They can be made from the standard two-impression mold shown in Fig. 8 which produces a ¼-in. standard AFS dog bone specimen. These specimens also require strike-off. It should be done in both directions from the center of the longitudinal axis, and with reasonable care a smooth surface can be obtained.

Here again a suitable testing machine is used, or some relative method is employed for the foundry to compare specimens through consistent means of applying stress.

While there is nothing new in making these and similar tests in foundries of various molding and core materials, our experience at Production Pattern & Foundry—particularly in shell molding—indicates the need for these simple test methods for the following reasons:

1. Variations in resins supplied by different resin suppliers, as well as batch-to-batch variations from the same supplier. Checking and testing of resins received by foundries is extremely difficult.
2. Variations in fineness, moisture content, and organic material of sand.
3. The need for control in maintaining a consistent mixing practice.

Because of material costs involved in shell molding and coremaking, it is vital that casting yield be maintained as close as possible to 100 per cent casting yield, and by these relatively simple tests the foundry has a tool that will assist it in preventing needless losses from faulty molds and cores.

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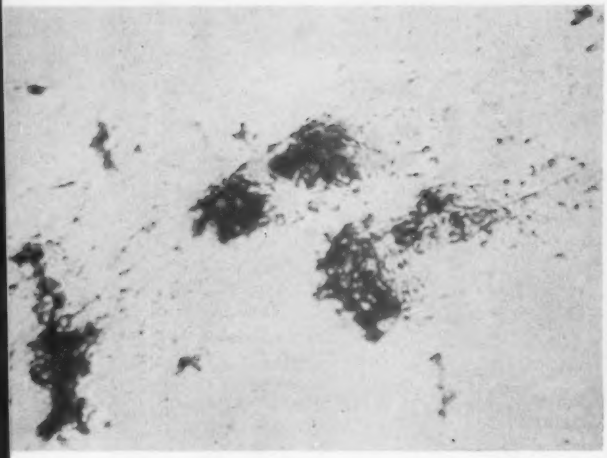

Fig. 1—First stage of graphite rosette formation after 1 hour at 800° C. Globular white spots are believed to be secondary carbides. Magnification 1500X. Etched and repolished

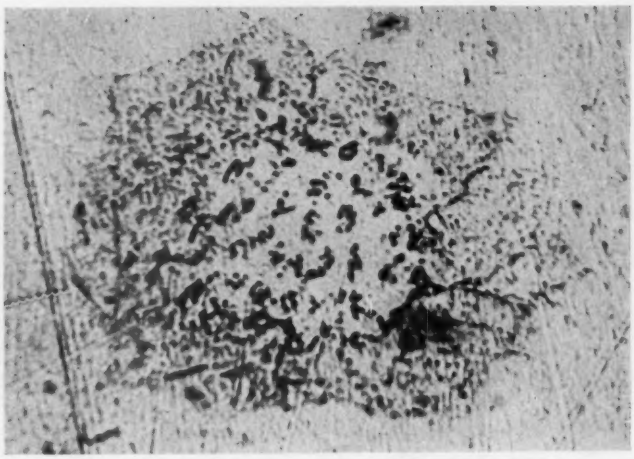

Fig. 2—Second stage of graphite formation after 2 to 3 hours at 800° C. Graphite flakes are seen in ferritic center, surrounded by a dark etching graphitic layer. Magnification 1500X

Solid State Graphitization

In Iron-Carbon-Silicon Alloys

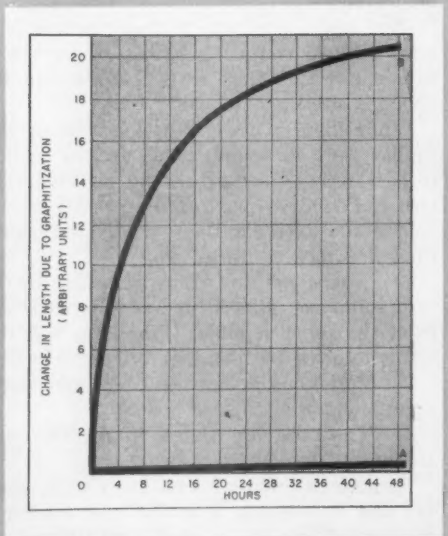

Fig. 5—Comparison of graphitization rates expressed in change of length as a function of time in prequenched (B) and nonprequenched (A) specimen of high-sulfur content

The author describes graphite rosette nucleation and growth in a hypoeutectic white cast iron. Presence of a dark etching layer that contained flake graphite was observed around the growing rosettes

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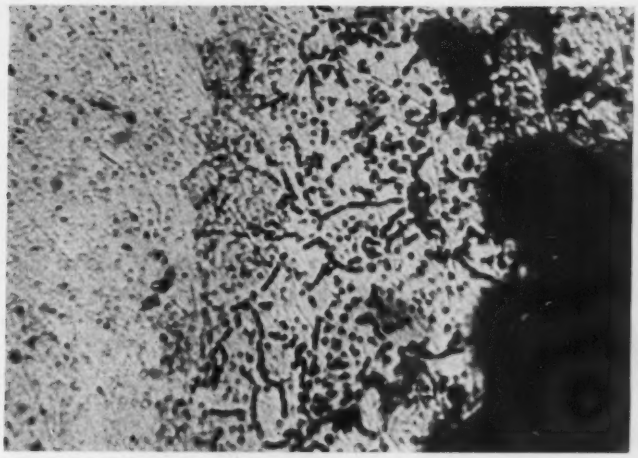

Fig. 3—Third stage, 4 to 8 hours at 800° C. Massive graphite rosette is surrounded by a dark etching layer containing flake graphite. Magnification 1500X. Etched and repolished

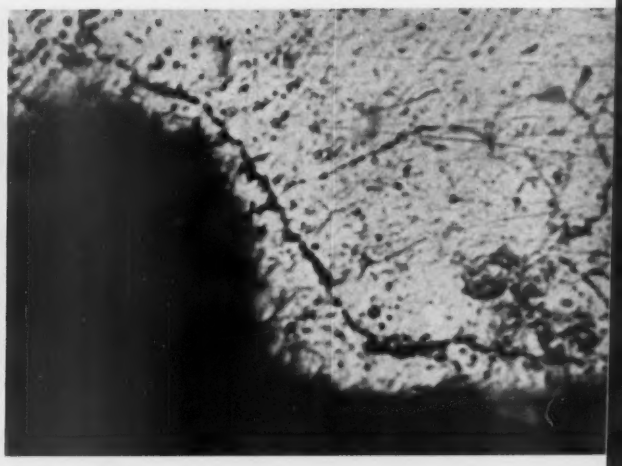

Fig. 4—End of graphite rosette growth, 10 to 20 hours at 800° C. The dark etching layer has been superseded by a thin graphite envelope. Magnification 1500X. Etched and repolished

IN THE course of research on solid state graphitization of hypoeutectic white cast irons, the growth of the graphite rosette was studied under the microscope. The observed results are sufficiently at variance with the accepted view of graphite formation[1, 2] to warrant being reported at this time.

Small specimens 5 mm in diameter and 10 mm long were heated to 800° C (1472° F) by putting them into an already hot furnace of 1-in. diameter. The required temperature was reached in a few minutes. Specimens were held at that temperature for different periods of time, thus enabling the graphite rosettes to grow to different sizes. Samples were prepared for microscopical study, they were etched and then repolished to bring out the precipitates more clearly.

Four distinct stages in the graphite rosette formation were observed. The first stage, Fig. 1, following what has been called the incubation time[1] shows very fine graphite flakes intermingled with globular spots, presumably precipitated carbides. In the second stage, Fig. 2, graphite flakes are seen in a ferrite center, which is surrounded by a dark etching layer. This layer contains very fine flake graphite intermingled with globular spots. The third stage, shown by Fig. 3, is characterized by massive graphite rosettes surrounded by a dark etching layer in which the same intermingling of flake graphite and globular spots is observable as in stage 2, but in a more pronounced manner.

The fourth stage represents the end of the graphite rosette growth and Fig. 4 shows the disappearance of the dark etching layer around the graphite rosette, its place being taken by a thin envelope of graphite flakes.

On the assumption that the white globular spots are secondary carbides and the dark etching layer contains finely dispersed carbides, the process of graphitization is pictured as occurring in two steps:

1. The precipitation of secondary globular carbides from austenite.

2. The decomposition of globular carbides into graphite and carbon depleted austenite.

A gradient of carbon concentration is thus created which causes a continuous dissolution of the primary carbides in austenite, until the full decomposition of the latter into ferrite and graphite at the eutectoid temperature.

That the precipitation of secondary carbide is a prerequisite for graphite formation—a point overlooked by previous investigators—is demonstrated by the following observation:

1. In chilled cast irons the process of graphitization can be accelerated by a previous treatment, consisting of quenching from austenitic temperature followed by tempering below the Ac_1 point. This treatment, as is well known, increases the amount of secondary carbides and thus cuts down substantially the incubation period.

2. In sulfur-rich chilled cast iron, which resists graphitization upon reheating, a similar treatment to that described previously can effectively induce graphitization.

This last instance is illustrated by the dilatometric traces of Fig. 5. Curve A—untreated—shows no change of length at 800° C, while curve B—heat treated—shows considerable expansion due to graphitization.

The practical implications of the accelerating treatment of graphitization described previously are under study.

References

1 Burke & Owen, Journal, Iron & Steel Institute, February, 1954.

2 Berman & Kondic, Ibidem, April, 1954.

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Shrinkage Prevention in Bronze Castings

In this second of three articles, the author discusses pouring and feeding methods and the use of chills in obtaining sound bronze castings

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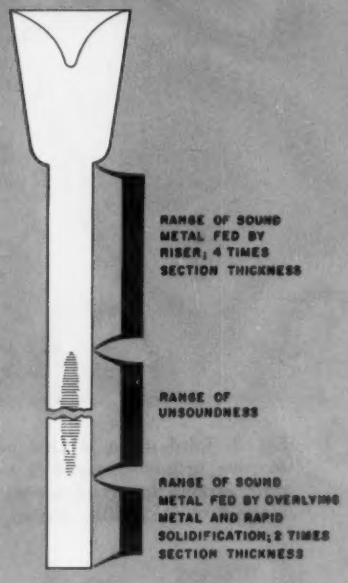

RANGE OF SOUND METAL FED BY RISER; 4 TIMES SECTION THICKNESS
RANGE OF UNSOUNDNESS
RANGE OF SOUND METAL FED BY OVERLYING METAL AND RAPID SOLIDIFICATION; 2 TIMES SECTION THICKNESS

Fig. 10—Vertically poured flat plate, illustrating sound metal at bottom and top, with shrinkage between caused by lack of feed

MOST casting designs have uniform sections, either continuous in a single direction or changing in direction—such as in uniform-walled cylinders or in castings containing ribs, bosses, and internal chambers.

The author has noted numerous recommendations that uniform sections be used wherever possible, and it is not the desire at present to discount such recommendations. Rather, he intends to discuss the solidification of the metal in uniform sections, show where discontinuities may occur, discuss methods of avoiding these discontinuities, and permit the reader to judge whether uniform sections can be used safely.

Let us first make the theoretical assumption that the plate shown in Fig. 10 is filled instantly with metal so that when the mold and riser are completely filled, the temperature is exactly the same throughout. As reported by Brinson and Duma,[4] the lower portion of any vertically cast plate will be solid for a distance of approximately twice the section thickness, because of self feeding. This feeding at the bottom of the casting results from the weight of the metal lying immediately above and the rapid cooling of the first metal into the mold cavity.

This condition occurs only when the cooler metal is at the bottom of the mold cavity, or when suitable temperature gradients can be set up to initiate freezing at the bottom. The riser will feed a distance of four times the section thickness, provided the riser is kept open to the atmosphere and contains sufficient liquid metal. Little or no additional feeding will be obtained by increasing the size of the riser over that necessary to provide just enough metal to feed this top portion. The area lying between the top and bottom feeding areas mentioned will not be fed, and shrinkage will occur.

This situation should not be too difficult to visualize, considering the way the metal solidifies. First, there will be the chilled skin and the columnar dendrites growing inward. Some of these dendrites grow faster than others and will meet at or near the midline of the section. Where these dendrites closely approach each other they hinder the passage of liquid metal and prevent feeding to areas situated adjacent to them.

Height a Factor—If the height of the casting is not more than six times the section thickness, soundness should result, regardless of the pouring speed, provided the riser is of sufficient size. Unfortunately, most uniform sections are higher than this, and complete feeding throughout can be accomplished only by providing complete directional solidification. In an extended, vertically positioned uniform section, this is done most easily and economically by slow top pouring which permits the metal to freeze almost as fast as it rises in the mold, with a molten layer present to feed the comparatively shallow layer of freezing metal below it.

This practice is illustrated in Fig. 11 where pencil gates are employed to control the speed of the pouring. In many cases where this method is used, there is a tendency to use too many gates and to make them too large, thereby filling the mold quickly and defeating the whole purpose of the top

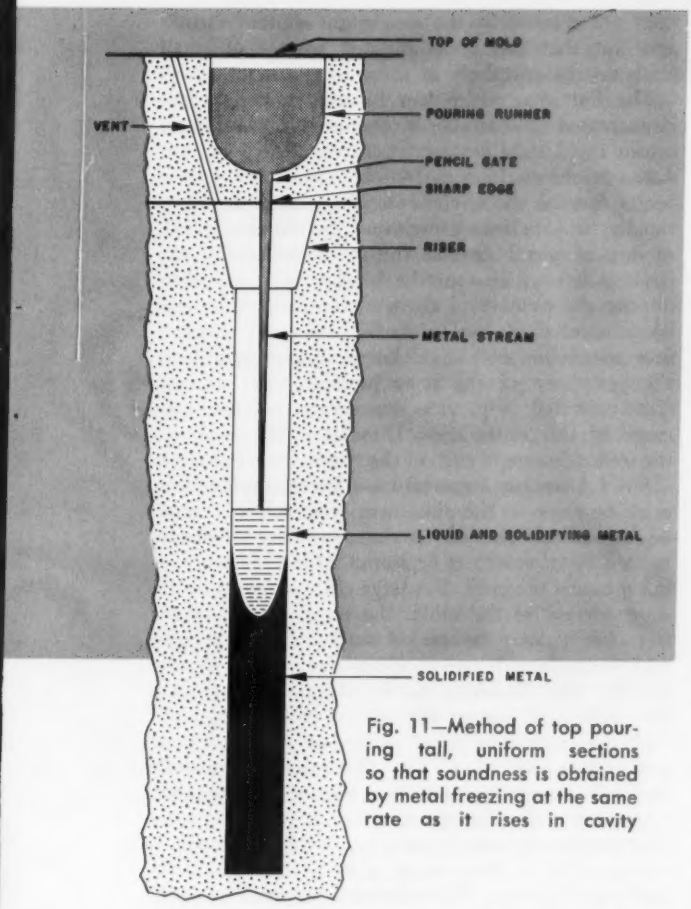


Fig. 11—Method of top pouring tall, uniform sections so that soundness is obtained by metal freezing at the same rate as it rises in cavity

pouring. The author has poured cylinders 4 ft high and 12 in. ID with 1¼-in. walls, using four 3/16-in. pencil gates. More than 20 minutes elapsed during the pour. An insulated ladle was used to retain the necessary metal temperature. Complete soundness was obtained. Castings withstood high service pressures on the finished 1-inch walls resulting from machining on both surfaces.

With heavier walls, the pouring time can be reduced considerably by forming one or both of the mold wall surfaces from chills. When this is practicable, fine-grain metal is obtained and thicker walls may be poured without danger of obtaining equiaxed grains. When using chills, great care must be taken to control the streams of metals so that no splashing will occur, and to insure that the metal streams do not strike the chill surfaces.

When pouring through pencil gates, sharp bottom edges must be preserved on the gate openings where they enter the riser cavity. Also, all mold washes must be kept off this area. The only opportunity for the atmosphere to exert pressure on the riser is by passage through the mold or core. The sharp corner at the lower end of the pencil gate will provide a sufficient hot spot[8] to permit the ingress of air into the riser in accordance with the William's principle. If the corner is rounded or made impermeable with a wash, there would be little or no opportunity for the necessary atmospheric break-through, which must be present.

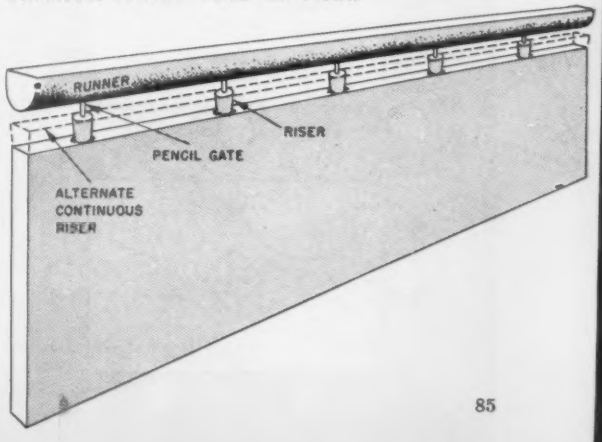
Spacing the Risers—Fig. 12 shows a fairly extensive plate cast by the described method. The space between risers must be not more than eight times the casting thickness. End risers should not be more than four times the casting thickness from the end of the casting. An alternate method of risering would be a continuous riser over the whole top of the casting, as indicated by dotted lines.

Whether the continuous or the multiple risers are used is chiefly a matter of economy in molding. The continuous riser probably could be simply a prolongation of the casting without a taper, since only a very small riser is needed to feed the last few inches of the casting. If all conditions are kept under control, the actual feeding required from the riser should not be more than twice the thickness of the casting wall. Where applicable or more convenient, a variation of the pencil gate method may be used. It consists of side risers with small gates entering them. It should be evident that top pouring would serve equally well for a cylinder molded on end.

Since many intricate castings have some uniform sections which can be molded and poured only horizontally, methods must be derived to cast such sections completely sound. In general, the rules for feeding vertical sections will apply for casting horizontally. Slow pouring may be a disadvantage, due chiefly to the tendency of molten metal to form narrow streams and separate pools of metal as it enters the mold. These small pools and rivulets can become chilled sufficiently to prevent complete coalescense. This circumstance necessitates pouring faster to fill the flat sections of the mold before solidification can occur at scattered locations. On the other hand, fast pouring would naturally eliminate the advantages described previously for slow pouring of vertical sections.

If the diameter of the flat uniform section shown in Fig. 13 is about eight times the section thickness, it should be possible to obtain a sound casting with rapid pouring. The dotted lines in the figure indicate the approximate feeding range of each riser. To obtain this feeding, each riser must be supplied with the hottest metal, preferably by a suitable common runner. The three small triangular sec-

Fig. 12—Sketch of uniform wall plate after shakeout, showing risers, pencil gates, and continuous runner. Vents not shown



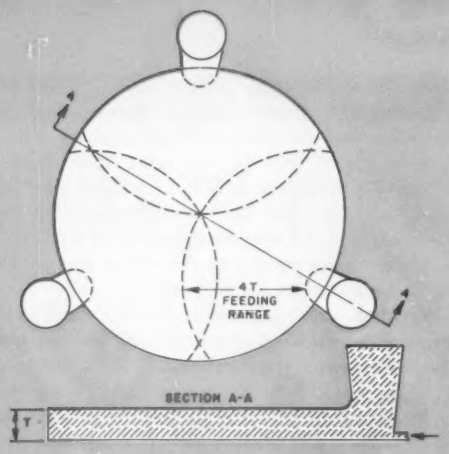


Fig. 13—Feeding of a uniformly thick, round plate poured in flat position. Metal should enter all risers through common runner

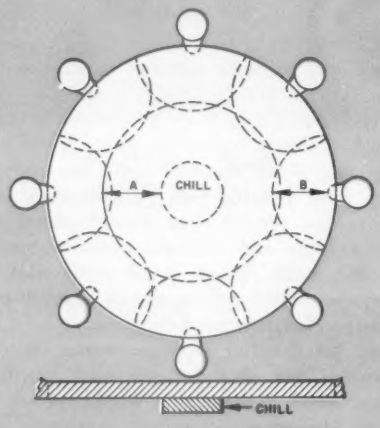
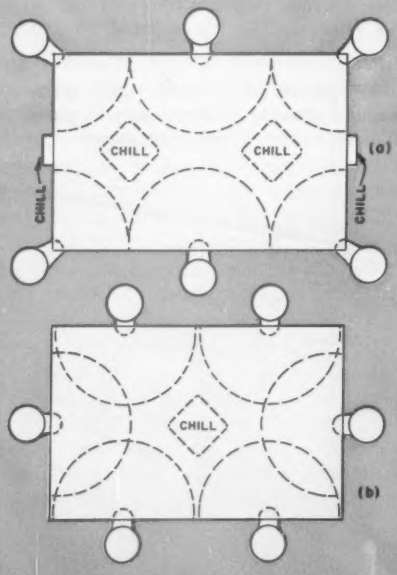


Fig. 14—Combination of risers and center chill to obtain complete soundness in a circular plate poured in the flat position

Fig. 15—Combinations of risers and chills to obtain soundness in rectangular plate



tions not reached by the arcs might contain shrinkage, but that can be eliminated by use of small chills on the periphery at those locations.

The flat area which can be fed completely can be increased considerably by the use of a chill which causes rapid solidification in its vicinity. This condition is shown in Fig. 14 where the chill at the center face of the circle causes the metal to freeze rapidly to a distance represented by dimension (a). A ring of metal around the outer portion of the circle is left which must be fed by risers. In determining the number of risers to be used, each must be considered to feed a circle having a radius of four times the section thickness as measured from the periphery of the riser junction, and enough risers supplied to provide reasonably complete coverage of this outer area. Dimension (b) indicates the feeding range of each of the risers.

Chill Location Important — Some consideration must be given to the placement of the chill. It must be remembered that for maximum cooling efficiency, *molten metal must not be permitted to flow continuously across the chill.* If a large chill is placed in the drag portion of the mold, the metal streams flowing over it may be cooled sufficiently to prevent their complete knitting when they meet in the middle. This difficulty can be prevented by placing the chill in the cope side of the mold cavity, but that can introduce other difficulties unless special precautions are taken. Fig. 15 shows two possible methods for casting a rectangular section, utilizing risers and chills. Arrangement (b) is probably better and more economical since complete advantage is taken of the feeding range of each riser and fewer chills are required. The reasoning involved in working out the ideal placements would be:

1. Select riser locations to use the smallest number of risers that will give complete coverage around the periphery of the casting.

2. Select chills of the correct size and shape to cause rapid solidification in the central area which cannot be fed by risers. The chills should have good heat conductivity and high heat capacity, and should have a thickness about the same as that of the section being cast.

The question naturally arises as to whether risers may be used in place of chills. Several disadvantages in the use of risers on the casting surface are as follows: 1. An increased amount of metal will be required in the riser. 2. The riser creates a hot spot which leads to large grain growth. 3. It would be impracticable in most cases to lead hot metal into centrally located risers. (Feeding of "cold metal" risers is very uncertain unless they are made considerably larger than would ordinarily be required.) 4. Risers are often difficult to remove from the casting surface.

Fig. 16 shows such a riser placed on a uniform section. Theoretically, if the hottest metal is poured directly into the riser to obtain maximum feeding, the junction of riser and casting will require a cross-sectional area of twice the casting thickness. This is indicated by the dotted semicircle on the sketch. When the metal flows through the mold cavity into the riser, the junction will have to be considerably

larger than the theoretical requirements. The riser walls will have to flare considerably more than would be necessary with a "hot metal" riser, and special care will have to be taken to keep the riser open to the atmosphere, otherwise secondary shrinkage will be almost certain to occur.

In general, the author recommends chills where their use is practicable. There will be cases in joined sections where the use of chills will not be possible and metal cannot be led directly into risers. In such cases, "cold metal" risers will have to be used if completely sound castings are to be obtained.

What To Avoid—It is repeated that the flat position for uniform sections should be avoided wherever possible. If such positioning is necessary, it might be better to provide slight tapers to aid in setting up the desired directional solidification. Where large, flat, uniform-section castings must be cast, it is better to position them so that one edge is somewhat higher than the other. By so doing it becomes possible to use slow pouring when the riser is situated on the upper edge, as indicated in Fig. 11 and 12.

Ring castings can be considered as sections of circular plates, as short cylinders, or as doughnut type castings. Each will require distinctive techniques to achieve complete soundness yet should cause no real difficulties when cast by themselves.

As distinguished from the casting of plates, flat rings will best be cast "in the flat." Fig. 17 should be compared with Fig. 14. The width of the ring shown is four times its thickness. The six risers in Fig. 17 fail to cover the entire face of the ring, leaving six small triangular areas which may not be fed. Chills marked (c) are provided to initiate solidification in these areas. One additional riser would feed the ring without the use of the chills, but chills are a little easier to apply and are more economical than the addition of risers. With wider rings, increased chilling or additional risers would be required. It might even be necessary to put risers on the inner edge to insure complete feeding.

Rings can be cast vertically or in any other position. A typical example is the casting of pipe flanges, because few of the fitting and valve designs lend themselves to molding the flanges "in the flat." It would be perfectly feasible to cast a ring in the vertical position, using very slow pouring through pencil gates, exactly as previously described for uniform section plates. This method, however, is seldom applicable in practice. In most cases, it will be necessary to pour the ring rather rapidly, thus necessitating the use of chills, risers, or a combination of the two to provide complete feeding.

Even with chills and risers, the ring may be of such dimensions that it will be impossible or impracticable to attain complete soundness. As an example, Fig. 18 shows what could be expected with the usual method of risering a vertically positioned ring. In (a) the single riser feeds only the top portion of the ring for a radial distance of four times the casting thickness. Except for the small area at the bottom of the ring, which is self feeding for a distance of approximately two times the thickness, the balance of the casting would not be fed and shrinkage would be present, such as indicated by the shaded areas. In (b) the same casting is fed by two parting line risers but a considerable unfed area still remains.

Not Completely Sound—These two risering methods are usual for flanges which are cast vertically (pipe axis horizontal). It is evident that these two methods do not provide complete soundness. The usual way to obtain the required soundness is by tapering the sections, commonly known as padding.

Fig. 16—"Cold" riser for feeding the surfaces of flat plates. Riser neck diameter must exceed that of largest inscribed semicircle

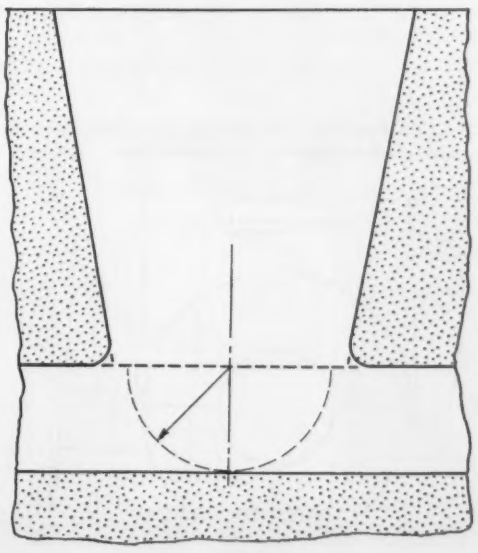
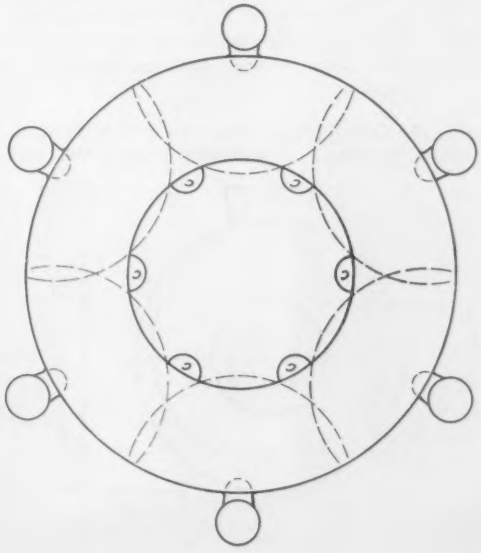


Fig. 17—Showing combination of risers and chills for obtaining soundness in a flat ring casting poured in the flat position



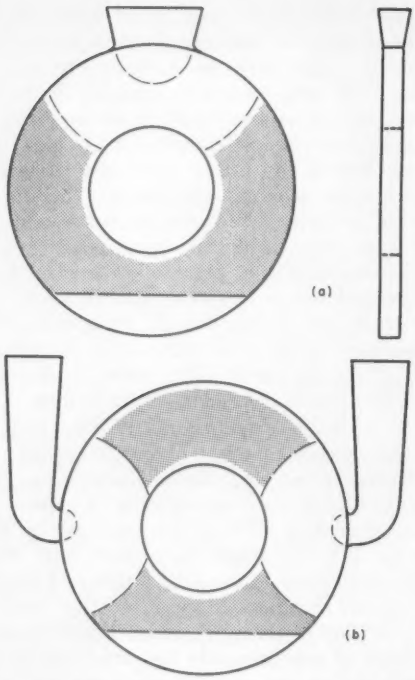


Fig. 18—Shrinkage in vertically poured flat rings. Single top riser is used with (a) and two parting line risers with (b)

Fig. 19 shows the amount and location of padding which will provide complete feeding with top risering, assuming that a suitable gating system is used to insure getting the hottest metal into the riser. The taper padding begins at the point above the bottom of the casting equal to twice the casting thickness and thence increases uniformly in thickness to the top of the ring.

The chief disadvantage of padding is that it generally must be removed before the casting is put in use. If done in the foundry, the removal is usually by chipping or grinding, both comparatively expensive operations. It may be more economical to both the foundry and the user to have the customer remove it in his regular machining operations. Another disadvantage is that padding increases the thickness of the casting. If the casting is designed with a thickness approaching the danger point insofar as sound columnar growth is concerned, this added thickness could possibly increase the dimension beyond the danger point and actually cause internal unsoundness. On the other hand, coarse-grained metal free from shrinkage will withstand high pressures without leaking better than will fine-grained metal having internal discontinuities.

Fig. 20 illustrates the padding which would be required to feed the casting with the parting line risering. The padding is added to place the maximum thickness along the parting line, and final feeding is accomplished by risers placed at this heaviest section. Riser tops must be higher than the casting.

There are other positions in which ring sections can be located in a casting but it is believed that the method described will be found applicable to other positions. There are also other methods of risering than those which have been illustrated which might better serve in certain specific cases. These will be discussed when such cases are considered.

Risering of Cylinders—As in the case of other shapes, the risering of cylinders will depend on the position of the cylinder in the mold, the dimensions, and the speed of pouring. In general, a cylinder molded with the axis vertical can be considered as a plate bent into circular form without a seam at the juncture. According to this consideration, the best way to produce a cylinder with uniform walls would be exactly the same as for plates cast on edge. That is, by top pouring slowly enough that the metal freezes at the same rate that it rises in the mold, and supplying only sufficient risers to feed the last layer of liquid metal at the top. In the case of a cylindrical ring with a vertical axis, it may be poured fast if its height is somewhat less than six times its wall thickness and complete risering is provided.

To pour a vertical cylinder whose height is greater than six times the wall thickness and at such a speed that the mold cavity will be entirely filled before there is any appreciable solidification, it will be necessary to resort to tapered sections, padding, or to suitable chilling.

The use of tapered padding is illustrated in Fig.

Fig. 19—Combination of top riser and padding to obtain soundness in vertically poured flat ring

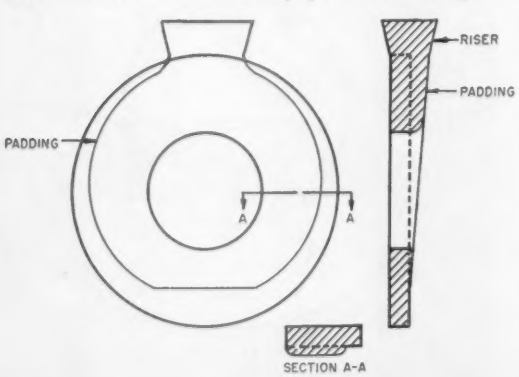
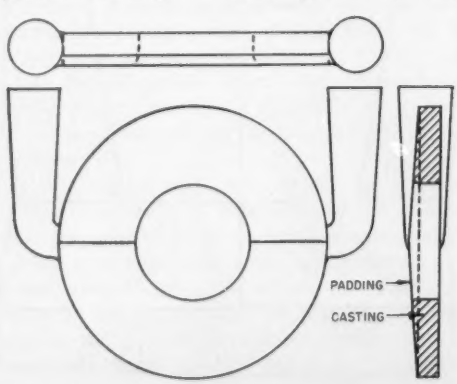


Fig. 20—Padding and parting line risers used to prevent shrinkage in vertically cast flat ring



21. The padding is added to the outside of the casting, beginning at the 2T height above the bottom and becoming uniformly thicker and wider as it rises to a higher level. At the top the several pads appear as corrugations. A riser is placed at the widest portion of each pad and the metal is poured into each riser through a common runner. Arranged in this way, each pad would feed downward and circumferentially. The suggested amount of taper is indicated by the light dash line on the side view. Taper should be sufficient to provide the necessary feeding yet the amount should not be greater than required for the particular job. Excessive padding not only requires extra metal, but the cost of removal will usually be greater.

Padding may be used on either the outside or the inside, whichever is more convenient, but should not be used on both sides. One surface should be cast to provide the minimum of finish so as to retain as much as possible of the chilled skin. The padding, of course, could be placed completely around the cylinder, but more metal would be required with no corresponding advantage in feeding.

Padding vs. Chills—It should be apparent that the use of padding to a certain extent may defeat its own purpose in that the extra thickness may be responsible for a certain amount of equiaxed grain growth which is prone to internal discontinuities. In most designs it should be possible to reduce the extent and the thickness of padding by the judicious use of chills. Chills have an advantage over padding in that they do not add extra metal which usually must be removed. If applied correctly, they will not cause the formation of heavy columnar or equiaxed structure, hence are less likely to cause internal defects. A rather complete discussion on chilling was presented by the author[5] in a previous series of articles.

Fig. 22 illustrates the use of chills and padding. The type of chill recommended is that originated at the Naval Research Laboratory.[6] The chills are wide at the point farthest removed from the riser and become smaller as they approach the riser. In the present case, as in most of the illustrations used, the chills are specially formed for the particular job, being cast with the same curvatures as the casting itself.

It hardly would be possible to obtain complete soundness in comparatively tall castings by the use of chills alone. For this reason risers at the top must be utilized to aid in complete feeding. Some padding also may be required. The foundryman must rely on his own experience to determine exactly how much padding and risering will be needed in any particular case.

(To be concluded)

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5. C. L. Frear, "Tin Bronze Castings," FOUNDRY, August, 1950, page 76.
6. W. H. Johnson, H. F. Bishop and W. S. Pellini, "Application of Chills To Improving Pressure Tightness of Gun Metal (88-8-4)," *Transactions*, AFS, Vol. 62, 1954, page 243.

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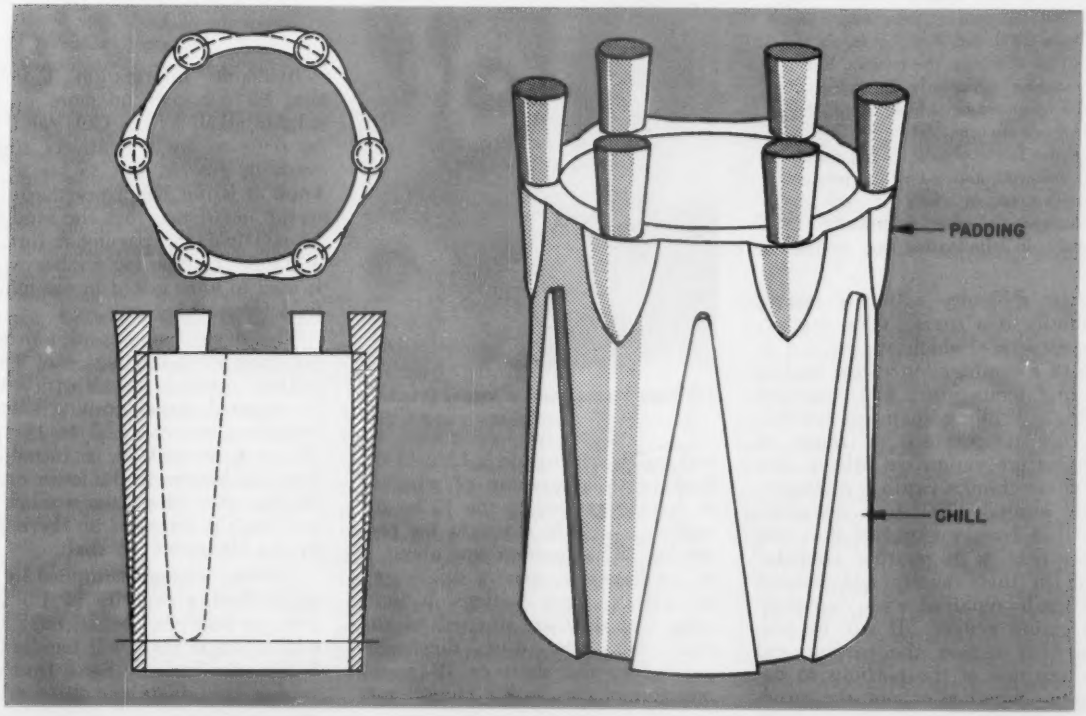
Fig. 21—Use of padding (one surface only) and risers to obtain sound vertically cast cylinder

Fig. 22—Risers, padding, and tapered chills to prevent shrinkage in vertically cast cylinder



Questions and Answers

Coarse open structure with poor groove surface on bronze casting points to high pouring temperature . . . Washing silicate bonded sand with water is reported to remove the major portion of the soluble alkali

Pouring Temperature Too High

We are having difficulty in producing satisfactorily a bronze casting similar to a sheave which is about 4 in. in diam, 3-in. face, contains a 1-in. hole, and weighs about 10¾ lb. The alloy contains 86 per cent Cu and 14 per cent Sn, made in our plant from new metals. Castings are made in a 12 x 18 in. flask from a matchboard pattern. Six patterns are on the plate, parted horizontally in two rows of three each with a single core for each row of three.

Pouring is through a cope and drag runner, both ¾ in. wide and ⅝ in. high with ingates slightly smaller to each casting. A shrink bob on the cope runner 1¾ in. long and 1¾ in. high is situated at each set of ingates. We have varied the pouring temperature between 2000 and 2150° F in an effort to eliminate the trouble, but it continues apparently regardless of the temperature although at higher temperature the defect is not as great. Evidently the gating system is incorrect and we will appreciate suggestions on how it may be changed or other information to assist in eliminating our trouble.

Your difficulty with the casting primarily is a coarse, open crystalline structure which we believe is due to a combination of too high a pouring temperature and improper gating. While opinion on suitable pouring temperature or range of temperature varies, we believe that for these chunky castings a temperature around 1900° F is desirable. On that basis we suggest that you experiment with pouring temperatures in that vicinity and observe the results obtained with your present gating system. It will be necessary to section the casting and fracture one of the portions to determine whether or not the structure of the casting is satisfactory.

Your gating system could be changed to advantage, but if decreasing the temperature gives satisfactory results there would be no reason to go to that expense. Suggested gating would be a tapered sprue with a ¾-in.-diam opening at the bottom into a runner in the cope only ¾ in. wide and ⅞ in. high. Gates into the castings would be ½ in. square. We do not believe the blind risers will be necessary, but they could be placed in position later if required. If they are needed we suggest that they be cylindrical rather than rectangular.

Your mentioning that you are making six castings in a 12 x 18 in. flask raises a question of whether or not the spacing in the 12 in. direction is a little too tight for best results. The castings are about 4 in. in diam and since a single core is used for three castings, it indicates that they are situated on the plate with the 4-in. dimension parallel to the short or 12-in. dimension of the flask. Hence, two castings occupy 8 in., leaving only 4 in. for spacing. Our guess is that the spacing is 1 in. between flask and castings and 2 in. in the center between castings. With a ¾-in.-wide runner, this would leave only ⅝ in. between runner and casting. This space does not allow much area for carrying off the steam generated by the heavy runner and heavy casting—particularly that in the grooves which form re-entrant angles.

Free application of the vent wire in the groove area will help, but it is preferable to provide more space between the castings.

Fracture shows coarse open structure

Reclaiming CO_2 Sand

Have any practical methods been developed for reclaiming sand used in making silicate-CO_2 molds and cores? If so, please send us an outline of these methods and any other technical information covering the processes. We would be interested particularly in the percentage of sand that can be reclaimed and reused in foundry operation as well as an approximate cost per ton to process the sand.

Available information indicates that 80 per cent or more of the soluble alkali left in CO_2 sand can be removed by a relatively simple washing process, but so far as we know it is not being practiced. Atterton mentioned that the sand can be reclaimed by passing it through a laboratory type log washer which is used to some extent in the mining field for washing ores.

The device consists of a trough mounted at an inclination of 3 to 6 degrees in which a shaft with spirally mounted blades forming a screw conveyor, rotates at 12 to 18 rpm. Water is sprayed in, or introduced from the bottom in the lower end of the trough. The water washes the sand as it is conveyed up the incline by the blades on the shaft.

The log washer mentioned by Atterton had a capacity of 1.5 to 2 tons per hour, but commercial units with a single shaft will handle 5 to 8 tons per hour. Sand from the washer contains about 10 per cent

water and must be dried. According to Atterton, the washed sand compared favorably with new sand.

Schumacher stated that one German foundry was using 60 per cent used CO_2 sand with 40 per cent new sand and 3½ per cent binder for coremaking without difficulty. Nothing was mentioned about any treatment of the used sand, but presumably it was crushed and screened to remove any lumps.

Change in Gating Suggested

Under separate cover we are forwarding a couple of bronze cock or valve castings showing severe pitting. The deep pits in the cope surface generally are coated with a white deposit that is assumed to be zinc oxide. Defect appears sporadically, usually one to three castings in a mold with others perfect. When trouble develops, it usually remains for days or weeks, but may disappear for like periods.

Alloy is 81-3-7-9 melted in No. 100 crucibles in gas-fired furnaces. Atmosphere is oxidizing, metal is deoxidized with about 2 oz per 100 lb of phosphor-copper shot. Pouring temperature ranges from 2050 to 2150° F depending on weight of castings, etc. Pouring temperature seems to have no effect, some of the worst castings being obtained with metal pulled from the furnace at 2100° F. Defect has occurred in the same mold with cold shuts and penetration from excessive heat. Metal has been switched from one source to another in the middle of a bad day without improvement. All-ingot charge gives same or worse results.

Sand has been changed repeatedly, with best results obtained by using all new sand, but is not 100 per cent effective. Sand is natural type, AFS fineness number of 123, permeability of 22, green compression strength of 7.5 psi, and clay content of 18 per cent. Models have been made with mulled facing, unmulled facing, and no facing with same results.

As you indicate, the white deposit in the holes or pits and on the surface of the castings definitely is zinc oxide, and that was confirmed by a chemical test. Presence of that material is indicative of high pouring temperature.

While the 81-3-7-9 alloy contains considerably more zinc than the 85-5-5-5 alloy, and there is more evolution of zinc fumes, the amount should not cause difficulty unless the metal temperature is excessively high. Pouring temperature range usually is given as 1925 or 1950 to 2250° F, and while you indicate 2050 to 2150° F as your pouring range, it may be that your pyrometer is not registering correctly, especially if it has not recently been checked against a standard instrument used only for that purpose.

Although you mention that much better results are obtained when all new sand is employed, we do not believe that the sand has anything to do with the defects. If sand were a source of the trouble, the defects would occur on other areas of the surface instead of being restricted to the cope. It appears to us that the grain fineness, permeability, and green compression strength are suitable for producing the castings satisfactorily.

We believe that the cure of your problem requires a change in gating which will permit better filling of the mold cavity and a reduction in pouring temperature. While your present gates appear adequate, attention is directed to the recess or undercut just behind the gate attachment which reduces the section thickness of the wall to one-half or less that of the gate. In other words, the actual gate into the casting is only one-half the size it appears to be. In addition, recesses or undercuts between the heavy seat section and the heavy hexagonal flanges reduce the wall sections to less than ⅛ in., which doesn't help conditions.

Bronze valve castings exhibit badly pocked surface as well as white deposit

It is suggested that the gating be changed to the opposite side or the top of the cock to avoid passing the metal through the thinner recessed or undercut section and provide a free flow. Place the gates and the runner in the cope instead of in the drag as at present, thereby enlarging the runner to ⅝ in. wide and ¾ in. high. Runner should extend several inches beyond the last pair of gates on the runner to act as a trap for any extraneous material carried in with the first rush of metal. Try gates ¼ in. square.

Opening of the bottom of the

tapered sprue into the runner should be 5/8 in. in diam. We note that the castings have small stop ears or projections on the area which is suggested for gating, but possible difficulty from that source in gate removal can be eliminated by turning the casting over so that the gate can be situated just above one of the ears.

Pouring temperature should be held as low as possible. It is advisable to make a survey of temperature range for each size of cocks or valves, and then see that they are poured within the range. You may find that it will be worthwhile to use smaller ladles or crucibles for pouring fewer molds. St. John mentions that the cooling rate of brass or bronze in the crucible is about 1° F per second, and if the pouring temperature range of the alloy is 120° F, the amount of metal in the crucible and number of molds to take that metal should be correlated on such a time and temperature basis. Too often the first molds are filled with metal which is too hot, and the last ones with metal which is too cold, resulting in defective castings in those two portions of the metal poured from a given crucible.

Has Trouble in Wetting Sand

Could you supply information on wetting agents used for better water penetration and absorption in gray iron sand heaps? The pitch and seacoal contents of our sand heaps reach a point at times where it is extremely difficult to get enough water into the sand. Where can this agent be obtained, how is it used, and what effect does it have when the castings are poured? We do not mull the sand. It is shaken out on the floor, water is put on from 5-gallon buckets, and then the sand is shoveled through a mechanical screening device.

Technically, wetting agents are surface-active materials which, when added to water, lower its surface tension or property of presenting the minimum surface area by collecting in drops. In plain English, wetting agents increase the spreading and penetrating power of water. They contain water-insoluble and water-soluble groups which are balanced to provide the most effective results. A commonly used type is composed of alkali salts or sulphonates of higher fatty alcohols and related compounds which are sold under various tradenames.

While it is preferable to secure a wetting agent which is designed for use in tempering sand, you might try addition to the water of small amounts of a common household detergent. The sudsing tendency of this material, however, presents a problem.

As to your method of adding moisture to the sand, we believe you would obtain more uniform results by spraying or sprinkling the water over the whole surface, instead of throwing in on a few areas from a bucket. This would be especially true when a wetting agent is added. So far as we know, additions of wetting agents will not affect the castings.

Melting and Pouring Copper

Can you tell us the best way to melt and pour copper to obtain solid anode castings, and still keep the copper from discoloring or darkening in a copper sulfate solution?

From available information it appears that in copper sulfate or fluoborate electroplating baths, copper anodes—whether cast, rolled, or electrolytic sheet—become coated with films of finely divided copper or copper oxide or both due to differences in efficiencies of the anode and the cathode or work to be plated.

Agitation of the bath, increasing the temperature, or increasing the acid concentration are recommended for decreasing this anode sludge which, presumably, is the discoloration or darkening you mention. Hence, with the possible exception of presence of oxides in the anode, the problem lies in handling the anodes in the bath, and not in melting and pouring.

Copper, as you know, tends to pick up furnace gases, particularly hydrogen, more rapidly and to a greater extent than when it is alloyed to form bronze, brass, etc. Consequently, it must be degassed thoroughly before pouring if sound castings are to result. Degassing agents reported to give good results with copper include lithium and calcium boride.

Copper should be melted and brought to temperature as rapidly as possible. Temperature should not be any higher than necessary to permit skimming, handling to the mold side and pouring. Suitable pouring range is given as 2070° F for light-sectioned castings, but you will have to determine for yourself the most suitable range. As soon as the metal reaches the desired temperature, it should be degassed and poured. High temperatures and stewing in the furnace promote gas pickup.

Carwheels Are Heat Treated

In the June issue we noted with interest the inquiry "Details for Design of Gate Core" on page 82. Since we operate a chilled iron foundry in France, this reference to carwheel molding attracted our attention. In our practice we shake out the mold in much less than one hour after pouring and quickly place the wheels in soaking pits. Is our understanding correct that in the foundry procedure indicated the carwheels are not allowed to soak in pits? If true we imagine that it would apply only to small diameter carwheels, and we would like to know the limitation on diameter and weight.

In the inquiry you mention the request was only for information on a specific gating method for cast steel carwheels, not chilled iron wheels, and the reply was limited to that discussion. However, the cast steel carwheels are subjected to heat treatment somewhat different than in the case of chilled iron wheels.

After the wheels are allowed to cool in the molds, the practice is to place them in insulated pits for a period of about 5½ hours for stress relief. During that time they cool to 900 to 1000° F. Then the wheels are heated to 1750° F, held for 2 hours, and air-cooled to 1200° F. Wheels are reheated to 1450° F, held for 5 hours, and air cooled.

Chilled iron carwheels are handled in the manner you indicate. They are shaken out about 45 minutes after pouring and placed in the annealing or soaking pits. The time interval is usually such that the hub temperature is about 1900° F, the web about 1550° F, and the tread about 1200° F . This gives an average temperature on a volume basis of around 1550° F. Within 2 to 7 minutes after shakeout the wheels are placed in the insulated soaking pits where they cool slowly for 72 hours.

We have no information on size or weight limitations which will eliminate necessity for annealing or soaking. Possibly small wheels other than carwheels which do not have deeply chilled treads, and hence do not develop internal stresses, might not require heat treatment.

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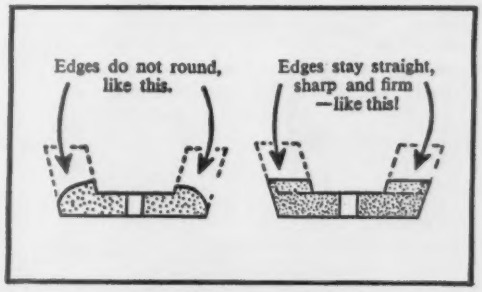

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Circle 604 on Page 131

Men of Industry

● WILLIAM D. McMILLAN
. . . named AFS director

● EDWIN H. BRUMLEY

● L. O. HOFSTETTER
Brumley-Donaldson Co. officers

● RAY P. DUNN
. . . new technical director

WILLIAM D. McMILLAN, supervisor of metallurgy, McCormick Works, International Harvester Co., Chicago, has been elected a national director of the American Foundrymen's Society. His term of office—until next April—will coincide with that of Garnet P. Phillips, International Harvester Co., Chicago, who remains on the board as an inactive member. Mr. McMillan, a graduate of the University of Chicago, has been with International Harvester since 1923.

Horace C. Cook has been appointed chief inspector, Cleveland Works, Aluminum Co. of America. From 1953, until closing of the Buffalo magnesium casting operations this year, he was works manager there. Mr. Cook was transferred to Buffalo in 1942 as foundry superintendent, after 12 years at the Cleveland Works. **Edward J. Fertal**, who has been foreman at Buffalo, has joined the Cleveland sand foundry.

Neil C. Reed has been named eastern district manager, Borg-Warner Industrial Cranes, Chicago, with headquarters in Bloomfield, N. J. He was formerly with Westinghouse Electric Corp., Pittsburgh.

Paul C. Bailey has been named manager of sales and manufacturing for the brass division, Bohn Aluminum & Brass Corp., Detroit. He was appointed sales manager of the division in 1954.

● **Edwin H. Brumley** has been elected president, Brumley-Donaldson Co., Huntington Park, Calif., succeeding **L. O. Hofstetter**, who has been named vice chairman of the board. Mr. Brumley formerly was vice president. Mr. Hofstetter joined the company in 1938 and was secretary and general manager until 1950, when he became president. **E. L. Brumley** continues as board chairman.

William E. Daugherty has been appointed southwestern district sales manager, Mexico Refractories Co., Mexico, Mo. He will retain his office at Missouri Refractories Co. of Los Angeles, company subsidiary, which he joined last year as general manager.

Clarence A. Price has been named president, Uniloy Inc., Saline, Mich., subsidiary of Hoover Ball & Bearing Co., Ann Arbor, Mich. He formerly was vice president of Uniloy and general manager of the unit products division.

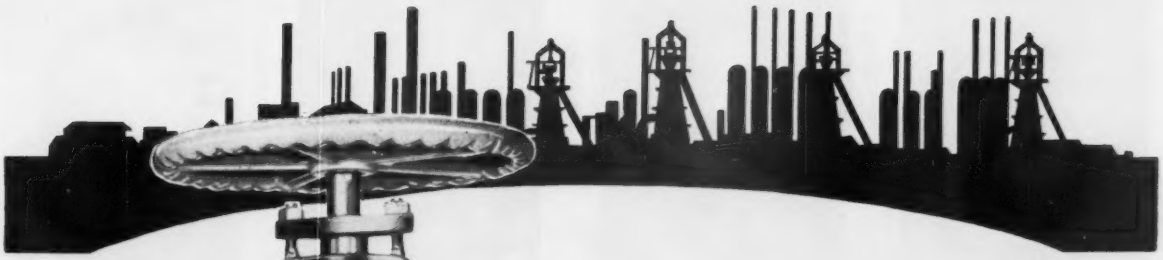
Ray O. Shaffer, president, Welex Inc., Ft. Worth, Tex., was elected a director, Reed Roller Bit Co., Houston, and will serve as chairman of the board. **John F. Maher**, former president, Oil Center Tool Co., Houston, has been named president of the company and a director, replacing **Rex G. Hamaker**. **A. H. Rowan**, board chairman, Rowan Drilling Co., Ft. Worth, has also been named a director.

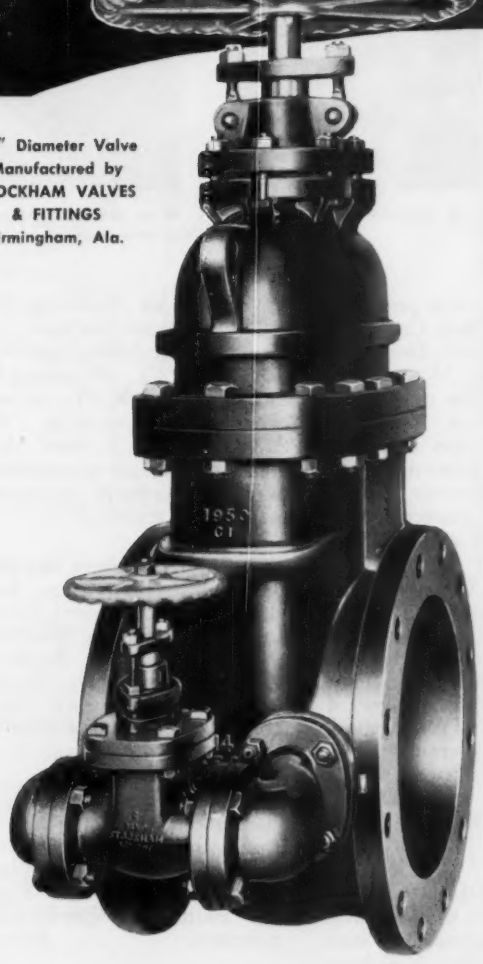
● **Ray P. Dunn**, for the last four years director of metallurgy, U. S. Reduction Co., East Chicago, Ind., has been appointed technical director, Lindberg Melting Div., Lindberg Engineering Co., Chicago. Active in technical organizations, he is currently secretary of the Die Casting and Permanent Mold Division, AFS.

Gordon L. Martin, elected chairman of the Northern California Chapter of the AFS for 1958-59, is vice president, Atlas Foundry & Mfg. Co., Richmond, Calif. He joined the company in 1948, following graduation from University of California, and has served in sales and production, becoming vice president in 1955. Mr. Martin has served as chairman of the local Gray Iron Founders' Society management group and is chairman of its cost group.

R. L. Clement has been appointed Detroit district manager, W. W. Sly Mfg. Co., Cleveland, succeeding **Arthur J. Manley**, who has been named Chicago district manager. Mr. Clement has been manager of production engineering at the company's factory for the last six years.

Edgar H. Dix Jr., since 1942 assistant director of research, Aluminum Co. of America, Pittsburgh, has retired. In 1923 he joined the company's research laboratories at New Kensington, Pa., as chief of the metallurgy section, and in 1930





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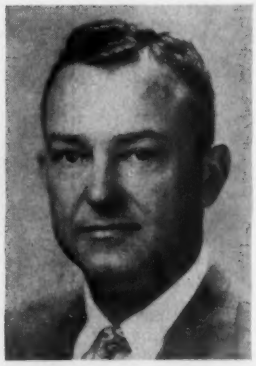
Circle 605 on Page 131

● PAUL G. JACKA
. . . joins Herman Pneumatic

● JOSEPH B. TERBELL
. . . heads Castings Branch

● WILLIAM S. WILLIAMS



● W. EDWARD MASENCUP JR.
Lynchburg Foundry Co. promotions

became chief metallurgist in charge of metallurgy there and at Cleveland. Mr. Dix has been honored by various technical societies for development of aluminum and magnesium alloys as well as high-strength corrosion-resistant aluminum products.

● **Paul G. Jacka** has been appointed general manager, Herman Pneumatic Machine Co., Pittsburgh, with headquarters at the Zelienople, Pa., plant. Until recently he was executive assistant to the president, J. I. Case International, subsidiary of J. I. Case Co., Racine, Wis., doing administrative work in connection with its plants in France, England, and Germany. Previously he was associated with Massey-Harris-Ferguson Inc., Racine, and was president, Goslin Birmingham Mfg. Co., Birmingham.

● **George F. Gilligan** has been named works manager of the Erie, Pa., plants, Bucyrus-Erie Co., South Milwaukee, Wis. Until recently he was manufacturing manager of the Franklin, Pa., plant, Joy Mfg. Co., Pittsburgh.

● **Joseph B. Terbell**, vice president of American Brake Shoe Co., New York, and its subsidiary, Dominion Brake Shoe Co. Ltd., Montreal, is on leave for six months to serve as chief, Castings Branch, Iron and Steel Division, Business and Defense Services Administration, Washington. He succeeds **Morris-E. Neeley Jr.**, sales manager, Dodge Steel Co., Philadelphia.

Gordon L. Paul has been appointed works manager of the Hansell-Elcock Co.'s Foundry Division, Chicago. **C. N. Outman** continues as manager of the division. Mr. Paul formerly was general manager of Sterling Foundry Co., Wellington, Ohio, subsidiary of Warner & Swasey Co., Cleveland. Previously he had been foundry superintendent, Brown & Sharpe Mfg. Co., Providence, R. I.

● **Frank P. Jones**, Oklahoma City, Okla., recently joined the southwest district sales organization, Bay State Abrasive Products Co., Westboro, Mass. He formerly was associated with Acme Hamilton Rubber Mfg. Co., Trenton, N. J.

● **W. Edward Masencup Jr.** has been appointed assistant general manager, Lynchburg Foundry Co., Lynchburg, Va., succeeding **Hampton W. Campbell**, who recently became general manager. **William S. Williams** has replaced Mr. Masencup as manager of standards. Mr. Williams formerly was assistant manager of standards.

C. C. Lay, treasurer, the Wheland Co., Chattanooga, Tenn., has been elected a vice president, Controllers Institute of America, New York, for the period starting September 1. **Victor L. Persbacker**, comptroller, American Brake Shoe Co., New York, was renamed assistant treasurer.

John D. MacKenzie has been elected chairman of the board, American Smelting & Refining Co., New York, succeeding the late Kenneth C. Brownell. Mr. MacKenzie will continue as president of the company.

● **George J. Peer** has been named sales manager, and **Jerry N. Potts** purchasing agent and office man-

● GEORGE F. GILLIGAN
. . . joins Bucyrus-Erie Co.

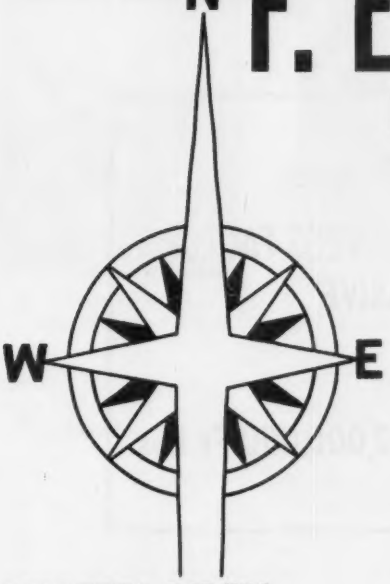
● FRANK P. JONES
. . . Bay State Abrasive sales

● JERRY N. POTTS

● GEORGE J. PEER
Vulcan Mold & Iron appointments

F. E. Mold Conveyors

For Continuous Casting



BULLETIN 141/NA . . . . . .

8 pages of facts and photos to prove why our F. E. Mold Conveyor can do it better . . ! Write us today for your copy.

F. E. Mold Conveyors are continuous, smooth, silent, jerk-free, dead level platforms of interlocking plates without gaps; no long chains or wheelcorners, and only one hidden low-power drive.

Strong, safe and clean; engineered for long life, giving high load capacity and peak production.

U. S. AND CANADIAN PATENTS PENDING

F. E. Mold Conveyors do the job . . . .

F. E. (NORTH AMERICA) LTD.

47 Advance Rd. Toronto 18, Ontario

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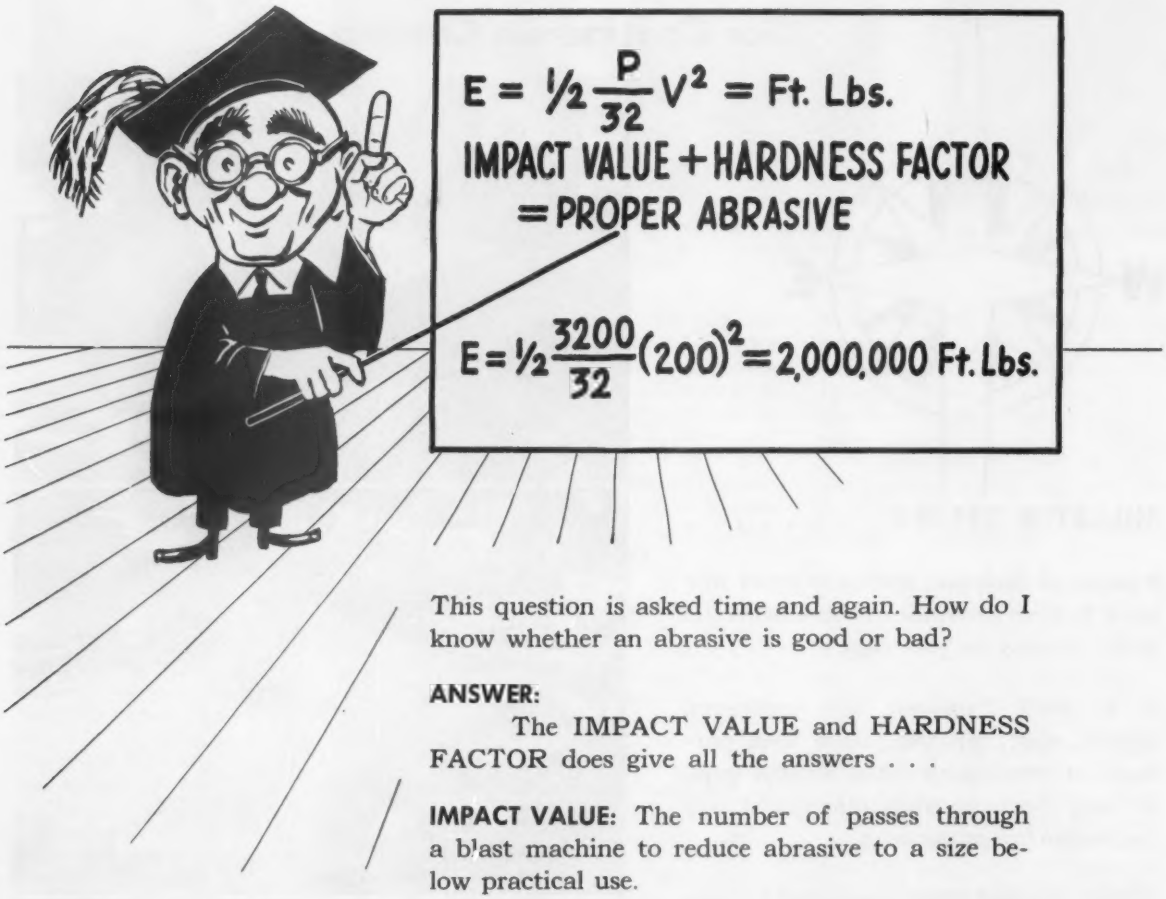
Circle 606 on Page 131

What really counts in blast cleaning abrasives?



This question is asked time and again. How do I know whether an abrasive is good or bad?

ANSWER:

The IMPACT VALUE and HARDNESS FACTOR does give all the answers . . .

IMPACT VALUE: The number of passes through a blast machine to reduce abrasive to a size below practical use.

HARDNESS FACTOR: The micro measurement of a particle calculated to a Rockwell (c) Scale.

AMASTEEL SHOT is produced with these two important characteristics in mind. Write today and we will have our Sales Engineer in your area determine for you, the Hardness Factor and Impact Value, necessary for the abrasive best suited for your use.

ALLOY METAL ABRASIVE CO.

ORIGINATORS OF CAST STEEL SHOT

123 S. DIVISION ST., ANN ARBOR, MICHIGAN

Branches in principal cities

Circle 607 on Page 131

● **THOMAS S. McCRORY**
. . . joins Wheelabrator Corp.

● **HUBERT FRUEHAUF**
. . . Dow Chemical dept. mgr.

● **PAUL CLEMENTS**
. . . general sales mgr.

● **LESTER A. SHEA**
. . . district sales mgr.

ager in Lansing, Ill., for the Chicago district plant of Vulcan Mold & Iron Co., Latrobe, Pa.

● **Thomas S. McCrory** has been appointed West Coast regional manager, Wheelabrator Corp., Mishawaka, Ind., with headquarters in Los Angeles. He will supervise that territory, Seattle, and San Francisco. Until recently he was western sales manager, Niles Tool Div., Baldwin-Lima-Hamilton Corp., Eddystone, Pa.

R. E. Just has resigned as plant manager, Burnham Corp., Lancaster, Pa. He joined the company two year ago. Previously he was associated with Wilkening Mfg. Co., Philadelphia.

● **William P. Hanks,** formerly southern district manager, has been named midwest district manager, Cleveland Tramrail Div., Cleveland Crane & Engineering Co., Wickliffe, Ohio. **Robert M. Underwood** has been appointed northeast district manager. Until recently he was with Crane Hoist & Engineering Co. in California.

● **Hubert Fruehauf** has been named manager of the new magnesium products department, Dow Chemical Co., Midland, Mich., responsible for fabricating and semi-fabricating operations at the company's divisions in Bay City, Mich., and Madison, Ill. He joined Dow Chemical in 1927. **Dr. J. D. Hanawalt,** manager of the former magnesium department and a company vice president, has been assigned to research and magnesium development.

● **Paul Clements,** formerly contract administrator of sales and sales engineering, Phillips & Buttorff Corp., Nashville, Tenn., has been made general sales manager. **H. M. Doak,** former vice president in charge of sales, has retired. Mr. Clements joined the company in 1955.

● **John J. Scherer** has been appointed district sales manager of the Detroit office recently opened by the S-P Mfg. Corp., Solon, Ohio. He has been in hydraulic equipment sales for 11 years. Mr. Scherer will be assisted by **James C. Sprague,** who recently joined the company.

● **Lester A. Shea** has been appointed Pennsylvania district sales manager, Lindberg Engineering Co. and Lindberg Industrial Corp., Chicago, with headquarters in Pittsburgh. He joined Lindberg Engineering Co. in 1937 and has been with Lindberg Industrial Corp. since 1954. **A. C. Whitaker** has been named a sales engineer in the Pittsburgh office of Lindberg Engineering Co.

William W. Maloney, general manager, American Foundrymen's Society, is recuperating at his home, 233 South Park Rd., La Grange, Ill., following a successful operation for a back ailment.

Thomas W. Pettus has been named president, Scullin Steel Co. Div., St. Louis, succeeding **E. F. Judge,** retired, who will continue as a consultant. Scullin Steel is a division of Universal Marion Corp., Marion, Ohio.

● **Charles W. Lueders Jr.** has joined Herman Pneumatic Machine Co., Pittsburgh, as sales-service engineer. His territory includes New

● **ROBERT M. UNDERWOOD**

● **WILLIAM P. HANKS**
appointments at Cleveland Tramrail Div.

● **JOHN J. SCHERER**
. . . district sales mgr.

● **CHARLES W. LUEDERS JR.**
. . . molding machine sales

International MINERALS CHEMICALS

A REPORT TO FOUNDRIES

FROM TOM BARLOW

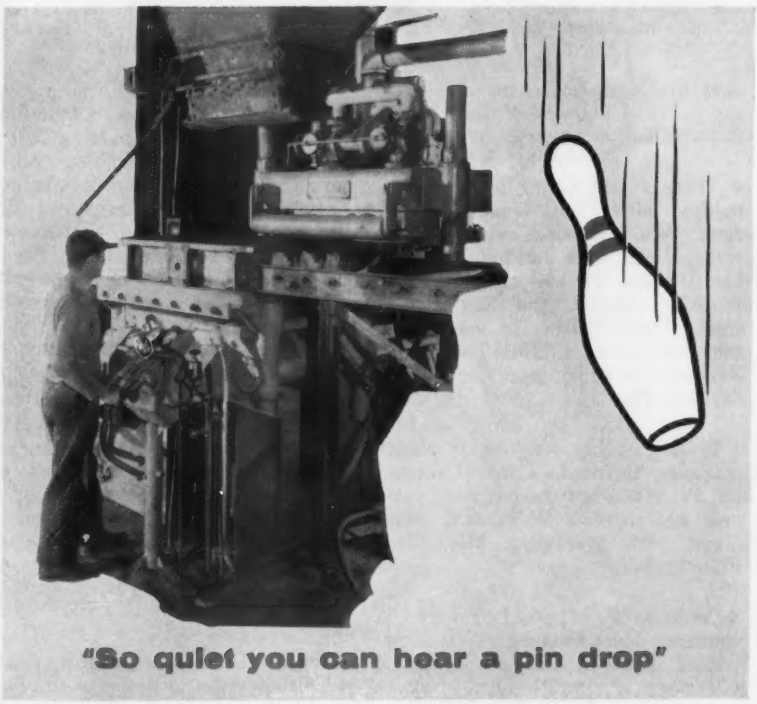
"Sound" reason for diaphragm molding

It has been stated frequently that "the foundry is a good place to work." We believe this. We also believe that the diaphragm method of molding helps to make it even more true. With this method, there's no jolting or pounding on the flasks, pattern or equipment. There is no noise fatigue on the operator, no need for heavy foundations to absorb the shock and vibration.

Granted, it may not be possible to translate quietness into profits. But remember — the same motions which create noise also cause maintenance of equipment, patterns, flask and rigging. These items are translatable into costs . . and their elimination, into profits.

Even beyond the reductions in noise and maintenance, the Taccone Diaphragm Molding Machine holds some pretty distinct advantages. Most people are even more impressed when the machine is equipped with auxiliary equipment to bring the flask to the machine and take the finished molds away.

However, foundrymen know that the most important feature over the long pull is not so much the ability to produce castings as the ability to sell them. That calls for quality. And there, in a word, you have the most important contribution of the Taccone Machine. An inherent part of the high-pressure molding concept is the capacity to make a mold of uniform density and hardness. This, in turn, results in a casting of better finish, size, control, dimensional stability and in satisfied customers.



"So quiet you can hear a pin drop"

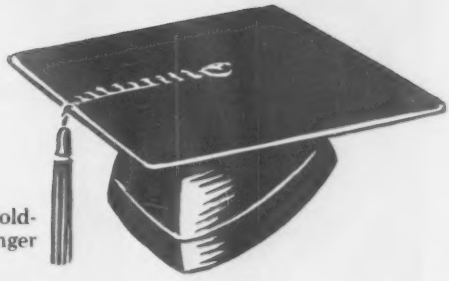
Contrary to most fireclay binders which enjoy only a local market, Revivo Bond is used nationally. Since 1923, it has been the standard of comparison for refractory bond clays. And because it is the strongest of the fireclay binders, less need be used. Result: higher permeability and flowability.

The high fusion and sintering point of sands made from Revivo Bond explains why it's so popular for heavy iron and steel castings. With its high strength, it burns out more slowly than other clays — particularly the bentonites. So costs are reduced.

Because more Revivo must be used as compared with the stronger bentonites, more clay is present in the sand. This means the sand dries out more slowly in use. It is less brittle, and patching is easier. Total expansion is lower, which lessens the tendency of rat-tails, buckles and scabs.

What's more, experimental work indicates less yield in mold walls with Revivo bonded sands than with bentonite sands. That's a big factor in maintaining dimensional accuracy of castings . . . and an even bigger one in preventing shrinks.

easiest quiz you've ever tried . . .



These days it's rare to pick up a magazine without encountering a quiz that rates your ability to get along with your wife, get along without your wife or some such subject. For those of us who rebel at consistently being classed as "average," the following quiz is guaranteed to restore confidence. Carries some pretty significant facts about Plasti-Bond, too.

WHAT CHEMICAL BOND...

1. Gives high flowability in molding sand with green strengths from 12 to 20 pounds . . . toughness exceeding 200?
2. Lets you operate 120 fineness sands with as little as 2% moisture or less?
3. Permits deep lifts with sand of less than 2% moisture?
4. Offers high ramming and molding hardness without danger of scabs and blows?
5. Enables you to pour brass, bronze, aluminum, gray iron and malleable in the same sand? (And gives you smoother castings on all of them!)
6. Lets you convert from tough to silky sand from batch to batch without changing the type of additive or base sand?
7. Improves the ability to blow green sand molds without reducing moisture or strength?
8. Maintains higher moistures in the summer to prevent drying out of sand without loss of finish and flowability?
9. Gives clean peel and a fine finish without sea coal or other carbonaceous materials?
10. Should be added if your sand is too tough?

Answers:

1. Plasti-Bond. 2. Plasti-Bond.
3. Plasti-Bond. 4. Plasti-Bond.
5. Plasti-Bond. 6. Plasti-Bond.
7. Plasti-Bond. 8. Plasti-Bond.
9. Plasti-Bond. 10. Nope, it's Maplex. Oh well, nobody's perfect.

molding mathematics

It may be reasonably obvious that the name *Triplact* is short for triple-action. Less obvious, though, is the fact that there are three different Triplacts, which means that there are a total of nine actions.

There is a Triplact for cores which, peculiarly enough, is known as Core Triplact. There is a Triplact designed especially for facing sands which we call Regular Triplact. And there is one particularly suited for continuous systems. That's XX Triplact.

Each of these materials performs its triple action as follows:

1. Increases the flowability of sand to provide harder, denser molds or cores and improved finish. Sand is softer, silkier, more workable . . . rams better on vertical surfaces and deep pockets. What's more, the sand blows or shoots better with standard equipment.
2. Provides a strong reducing atmosphere needed to stop burn-in and penetration. Castings clean faster and better.
3. Controls both expansion and collapsibility to eliminate buckles, scabs and veins. It's not a pitch, not a coal . . . will not cause lumpy shakeout or pitch balls. It gives a smoother, softer shake-out whether it's used in molding sand, oil sand cores or CO process cores.

EC-2-128

Creators of Living Minerals

EASTERN CLAY PRODUCTS DEPT.

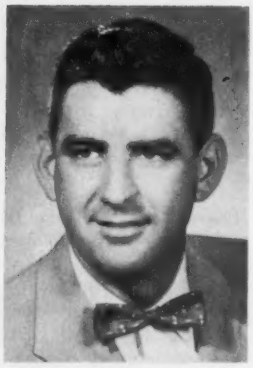
INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center, Old Orchard Road, Skokie, Illinois • ORchard 6-3000

● JOHN N. POMEROY JR.
. . . General Smelting pres.

● ROLLAND O. BAUM
. . . pres., Tennessee Products

● GARNET P. PHILLIPS
. . . research consultant



● E. F. HINES
. . . AFS Chapter chairman

Jersey, Delaware, Virginia, and parts of Pennsylvania and Maryland.

● **John N. Pomeroy Jr.** has been elected president, General Smelting Co., Philadelphia, succeeding **J. Nevin Pomeroy**, who has been made chairman of the board and senior consultant. The new president joined the company four years ago and has been serving as assistant to the president. J. Nevin Pomeroy joined the company in 1922, became vice president-treasurer, and was named president last year.

August D. Diedrich Jr., who recently joined Bay State Abrasive Products Co., Westboro, Mass., as Michigan district sales representative with headquarters in Detroit, formerly was associated with Michigan Abrasive Co., and not Mid-West Abrasive Co., as announced in the June issue.

R. L. Pope has been appointed Cleveland district manager, Electro Metallurgical Co., Division of Union Carbide Corp., New York. He succeeds **R. N. Fitzpatrick**, who has been assigned new duties in the New York office. Since 1956 Mr. Pope has been assistant manager of the marketing research division. **G. E. Smith** has been transferred to Cleveland from Pittsburgh. **P. L. Reiber Jr.**, formerly in Cleveland, has been assigned to Pittsburgh.

Charles E. Kimmel and **Robert Bockrath** have been appointed field technicians, Dow Chemical Co., Midland, Mich., in a new field-office technical-service program. Mr. Kimmel will be stationed in Chicago and Mr. Bockrath has been assigned to Los Angeles. Previously service personnel have been based at company headquarters.

● **Rolland O. Baum** has been elected president, Tennessee Products & Chemical Corp., Nashville, Tenn. **Carl McFarlin Sr.**, president since 1939, has been named chairman of the board. Mr. Baum formerly was executive vice president and general manager of the company.

Dale K. Holt has joined the Los Angeles branch office, American Air Filter Co., Louisville, Ky., as a sales engineer. **William A. McKim** has been transferred from the company's dust control products department to the Harry G. Mouat Co., Birmingham. **Charles Wunderlich** has joined the staff of C. H. Burnap Co., St. Louis, and **Vincent M. Quinn** has joined Hucker Sales Co., Haverford, Pa., as sales engineers. The Mouat, Burnap and Hucker companies are sales representatives for American Air Filter.

Richard Hayden, formerly head of the industrial furnace division, Eclipse Fuel Engineering Co., Rockford, Ill., has been named to direct gas furnace sales for Hevi-Duty Electric Co., Milwaukee, which recently acquired the division. **Norman Acker** will perform liaison work between the engineering, sales, and production departments at Hevi-Duty. He was formerly superintendent of furnace manufacturing at Eclipse. **William Swanson** has been appointed sales-service engineer for the Hevi-Duty company.

Raymond Robbins has joined Electronicast Div., Nilsen Mfg. Co., Addison, Ill., where he will have charge of reorganizing the inspection and quality control system. **Casimir Biedzinski** has been put in charge of tool engineering and tool production. **Henry A. Hycner** has joined the sales department of the division.

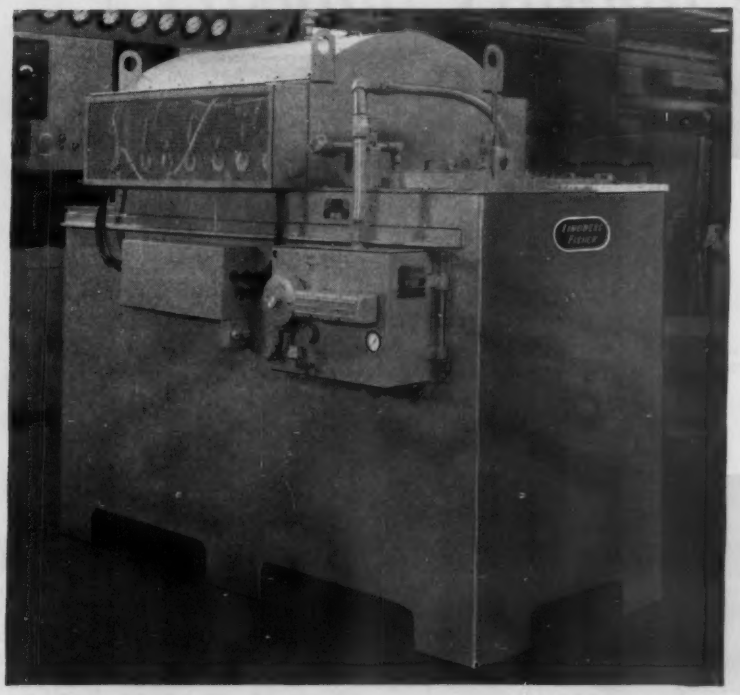
● **Garnet P. Phillips** has been named foundry research consultant, manufacturing research, International Harvester Co., Chicago. He was graduated from Rose Polytechnic Institute in 1925 and received his master of science degree from Carnegie Institute of Technology in 1926. Mr. Phillips joined the company in 1935 as chief metallurgist. In 1946 he was transferred to manufacturing research and in 1949 became general supervisor of foundry research. Active in technical organizations, he is a former chairman of the Chicago Chapter of the AFS and is currently a national director.

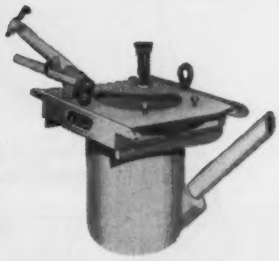
● **E. F. Hines,** elected chairman of the Tri-State Chapter of the AFS for 1958-59, is foundry manager, Nemco Foundry, division of Nelson Electric Mfg. Co., Tulsa, Okla. He joined the company in 1948, became sales manager in 1953, and foundry manager in 1955. Mr. Hines has been active in the Tri-State Chapter since its formation and has held all elective offices.

Robert J. Muth, formerly Los Angeles branch sales manager, Exide Industrial Div., Electric Storage Battery Co., has been transferred to the Philadelphia headquarters of the company as field sales manager.

Warren S. McKay, formerly assistant treasurer, has been elected secretary, United Engineering & Foundry Co., Pittsburgh. Mr. McKay is also assistant treasurer of the company's subsidiaries, Adamson United Co., Akron, Ohio, and Stedman Foundry & Machine Co., Aurora, Ind. **Edward G. Frey,** recently general accountant, has been named assistant treasurer of United Engineering & Foundry Co.

There's a Lindberg Aluminum Holding Furnace Just Right for Your Specific Job





This is Little Joe, the Lindberg Autoladle, the first practical automatic aluminum ladling unit yet devised. An exclusive feature of Lindberg electric resistance holding furnaces, "Little Joe" makes automatic casting of aluminum fast, dependable and economical.

Electric resistance holding furnaces for aluminum have been a specialty of Lindberg engineers for years. These furnaces have proved themselves in superior operation in varied industries, the world over. Now Lindberg offers a complete line, newly-designed, available in capacities of 1,000, 1,500, 2,000, and 3,500 lbs. If your production processes require proper holding of aluminum you can depend on Lindberg to provide just the right equipment for the most efficient and practical answer to your problems.

Lindberg makes a wide variety of melting and holding furnaces for aluminum, brass, bronze, tin, zinc, lead and other non-ferrous metals. These include aluminum induction, nose-pouring crucibles, electric resistance holding furnaces and big reverbs. For foundry, permanent mold or die-casting plant, independent or captive, there are Lindberg melting and holding furnaces to fit every need.

If your problem in this field needs a special solution Lindberg's design staff can find it. Just get in touch with the Lindberg plant or the Lindberg Field Representative in your locality, or write Lindberg-Fisher Division, Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California.

LINDBERG heat for industry

Circle 623 on Page 131

PERSONNEL NEEDS
of the foundry industry

By CLEMENT J. FREUND
Dean, College of Engineering
University of Detroit

Dean Freund's analysis of the type of men needed by foundries is based on a background of many years of association with the industry. His remarks originally were presented at the 1958 College-Industry Conference of the Foundry Educational Foundation.

VIEWING the foundry industry from the side-lines, it appears that it has much to gain by spending more money on research. "More money," I can hear someone say. "I'm research poor right now."

I know, of course, that the industry has a respectable research program. It has made progress in new molding methods, in improved heat treatment and melting processes, in attaining close dimensional controls. But I really don't believe that the foundry industry has spent as high a proportion of its earnings on research as have many other basic industries.

Furthermore, the kind of research I'm talking about is more closely related to merchandising than to processing of materials.

I have in mind the great research stations in the automobile industry. I don't mean their size, but their policies and attitude. I refer particularly to their styling sections which have been so helpful in selling cars—until this year—in spite of absurd 8-foot trunks which nobody needs, and cars too long to get into my garage.

Castings and Fish — At first sight, there doesn't seem to be much connection between castings and fish. But perhaps we can learn a thing or two from the Norwegians. Norway has two important natural resources—timber and fish. The Norwegians discovered long ago that people could not, or at least they would not, eat enough fish to keep their fishermen busy. So they established a research station, or stations, to explore the use of fish for purposes other than food.

The researchers have been diligent and resourceful. I have not been able to get all the details, but I am informed that only a minor portion of the fish output is now used for food. It seems that fish are now used for making such things as paint, varnish, medicines, fertilizers, adhesives, cosmetics, cleaning materials, animal food, and fabrics.

It might appear that foundry research should concentrate on metallurgy and ceramics. I believe foundry research should go far beyond, into the most advanced engineering technology. Who, more than foundrymen, should be concerned about heat transfer, fluid physics, elasticity and plasticity of materials, heat and thermodynamics, and solid state physics?

I particularly recommend research in what might be called the science of materials. Prior to ten years ago, most engineering research had to do with tangible, visible specimens. Now we have learned about phenomena within the molecule and the atom. We are told that the interior of the atom is as complex as the solar system. Foundrymen have to do with molten metal, a condition of metal in which molecules and atoms are especially significant.

The Right Kind of Man—What kind of man do you want for foundry research? I don't think it's at all important for him to have a foundry background. When General Motors Corp. was looking around two or three years ago for a man to head up its $150 million Technical Research Center, whom did it select? Lawrence Hafstadt, an atomic scientist, who probably didn't know any more about automobiles than you or I.

The man should be in close touch with current progress in the science of materials, including, of course, metallurgy and ceramics. He should know what is being done not only in the United States, but in Europe, Japan, and Russia.

He should be a first-rate laboratory technologist, or be able to direct a number of such people.

He should be a man with an overwhelming desire to improve materials and processes. He should be an enthusiast. He should have an extravagant imagination. He should be resourceful and dynamic.

He should be the kind of man you call crazy. But don't forget that Columbus, Fulton, Diesel, Westinghouse, the Wright brothers, Charles Kettering and Albert Ein-

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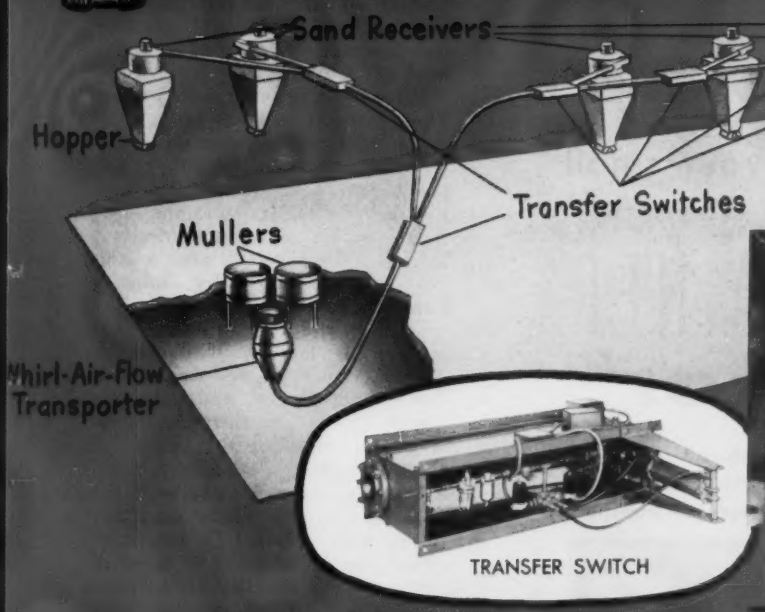
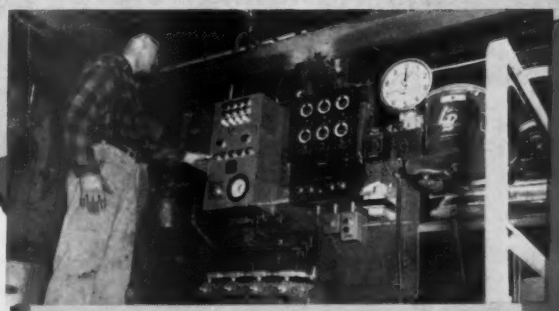
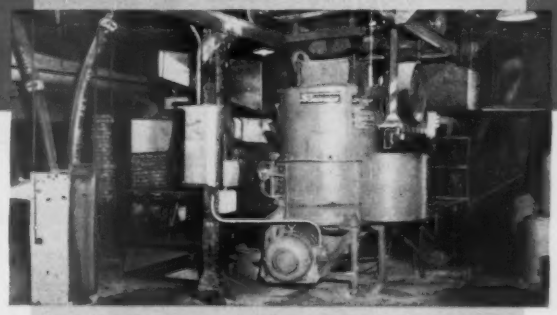
Pneumatic Handling of Core Sand



Transfer Switch permits delivery of material to any desired location. Work stations or storage can be located for best operation. Each transfer switch provides up to 3 way distribution as illustrated.



Press A Button—Dispatch sand to any of the 4 stations at the Gisholt Machine Company foundry.



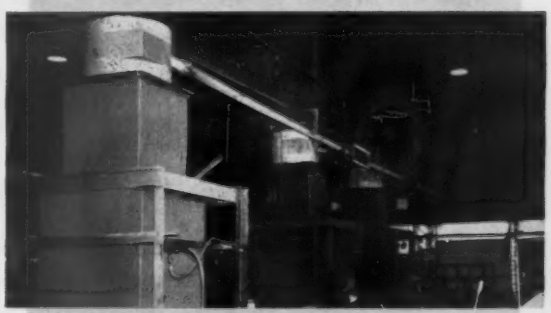
Muller discharges sand into the transporter and the switch directs it to large and small core rooms.

70% Cut In Sand Handling Time With WHIRL-AIR-FLOW System Reported By Gisholt Machine Co.

Confusion and production delays caused by use of overhead cranes when used to deliver core sands were reduced with the installation of Whirl-Air-Flow system.

After 3 trouble-free years experience with the Whirl-Air-Flow system in their Madison, Wisconsin foundry Gisholt Machine Company reports—One man now handles the entire sand distributing requirements to all work stations and all storage locations. (Two men were used full time on this job before, plus crane operator and crane.) With the addition of one transfer switch, one hopper and necessary tubing, facing materials can be delivered to the main bay with the present transporter without any additional labor.

Write, wire or phone. Find out how Whirl-Air-Flow can help you !



3 work stations in line receive sand as needed from transporter.

No maintenance is required—4" tube is large enough to supply this station in a remote part of the foundry with ample sand supply.

WHIRL AIR FLOW PNEUMATIC CONVEYORS

WHIRL-AIR-FLOW

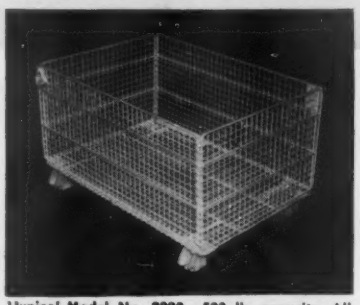
FEderal 9-0231

650 25th Avenue S. E., Minneapolis 14, Minnesota

the Answer .... to your small parts Handling–Storage–Transport

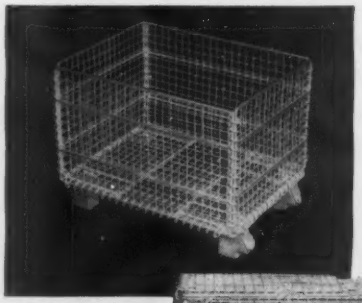
the NEW PALLETAINER® 'Junior'

• Close-mesh, all-steel containers with fold-down features • Ideal for *all* small parts handling–storage–transport

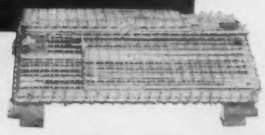


'Junior' Model No. 3220—500 lb. capacity. All welded steel wire mesh, reinforced. 32" long by 20" wide and 16" high. Mesh openings are 1½" square. Equipped with 4 fabricated steel stacking legs welded to deck bottom. Finished in fire-baked Aluminum paint. Weight 38 lbs.

• The new lightweight Palletainer 'Junior' models are sturdy, close-meshed, all-steel containers designed for efficient handling, storage, protection and safe transit of any small parts—assembled or finished products. Ruggedly built of reinforced welded steel wire mesh, the 'Juniors' incorporate many of the outstanding construction and convenience features found only on large, heavy-duty containers. Check your plant today—see how many places the 'Junior' models could smooth production, speed processing, deliveries and save valuable handling time.



'Junior' Model No. 2016—200 lb. capacity. 20" long by 16" wide and 12" high. All welded steel wire mesh. 1½" square mesh openings. Four fabricated steel stacking legs. Lossproof side locks. Aluminum painted. Weight 25 lbs.



'Junior' Palletainers fold down quickly and easily to save over 75% of their open area. Saves storage space, makes handling easier and lowers return shipping costs.

If you handle or process small parts . . . you need Palletainer 'Juniors'!

Try these tested, proved-in-service containers for all types of parts handling. They'll actually pay for themselves in handling savings. Write today for complete information, prices and delivery dates.

Palletainers are manufactured exclusively by

UNION STEEL PRODUCTS CO.

520 N. Berrien St., Albion, Michigan

MANUFACTURING PLANTS ALSO IN COMPTON, CALIF. AND WATERLOO, QUEBEC, CANADA

stein have all been called crazy.

With all his driving enthusiasm, he should be methodical, patient, and thorough when once he goes to work on a problem.

Where can you find such a man? There are lots of them being educated right now in our university graduate schools. But they are going into government jobs, into the universities, and into the electrical equipment, communication, aircraft, oil, chemical, and missile industries. The foundry industry ought to capture a few.

Of course, I don't contend that every little foundry should operate an important research setup. But foundries can undertake research jointly, or through industrial and technical societies.

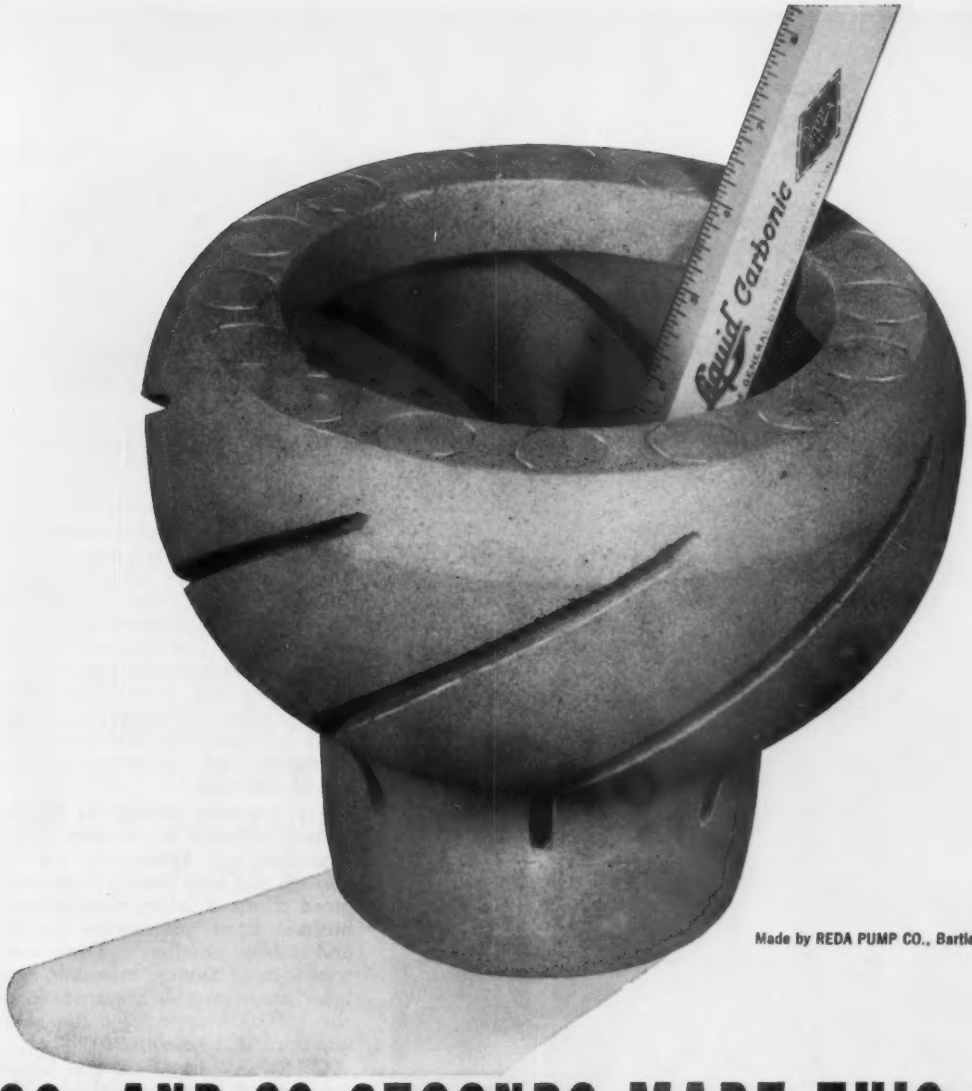
Merchandising—From my long-distance position, it looks as if the foundry industry needs merchandising most of all. To me, merchandising is not quite so broad as marketing. I use the word "merchandising" because merchandising to me implies a high-spirited, imaginative, resourceful and aggressive attitude, while marketing seems to me to be rather methodical, statistical, and stolid. Both are needed, of course.

I am thinking of the Nekoosa-Edwards Paper Co. of Wisconsin, one of the important stationery manufacturers of the world. I know something about the company because my father spent nearly fifty years in it. Originally it made newsprint. In time the Canadian mills took all its business as the result of a shift in the economic situation. The Nekoosa-Edwards directors didn't weep and wring their hands. They spent money and converted to the manufacture of kraft paper. Then the Carolina, Georgia, and Alabama mills took that business away from them. By enterprise and technology they again converted to the manufacture of stationery from wood pulp, at a time when everybody believed that writing paper could be made only from rags. And I am sure they can readjust again if they have to. That's what I call merchandising.

I am thinking about the Texas operations of the Dow Chemical Co. I should not be surprised if, before too long, they gave us structural materials made of sea water.

I am thinking of the lumber industry's concept that timber is not a fixed natural resource, but a crop, like corn or alfalfa.

If you are willing to go far afield, when I use the word "merchandising," I think about Helena Rubenstein, who hasn't done too



Made by REDA PUMP CO., Bartlesville, Oklahoma

CO_2 AND 20 SECONDS MADE THIS CORE

Can you make an intricate pump diffuser core like this—in 20 seconds? You *can* if you use CO_2.

The CO_2 process insures accuracy and dimensional stability. At the same time, it saves money by reducing labor costs and by eliminating the risks involved in baking and handling.

Write for our free report on other applications of the CO_2 process. Our engineering staff is always ready to work with you.

World's Largest Producer of

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Please send me a full report on core and mold making with CO_2.

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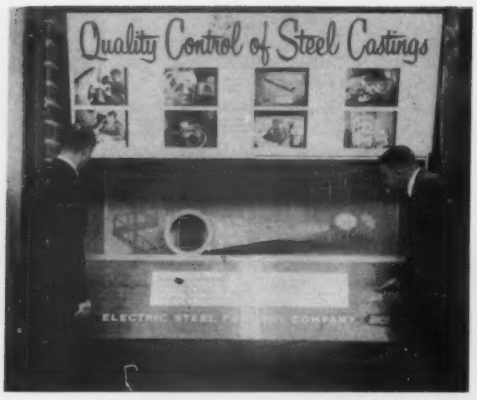
Company_____

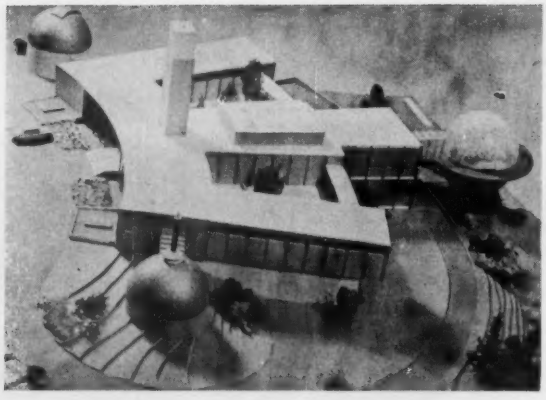
Address_____

City_____ Zone_____ State_____

Circle 612 on Page 131

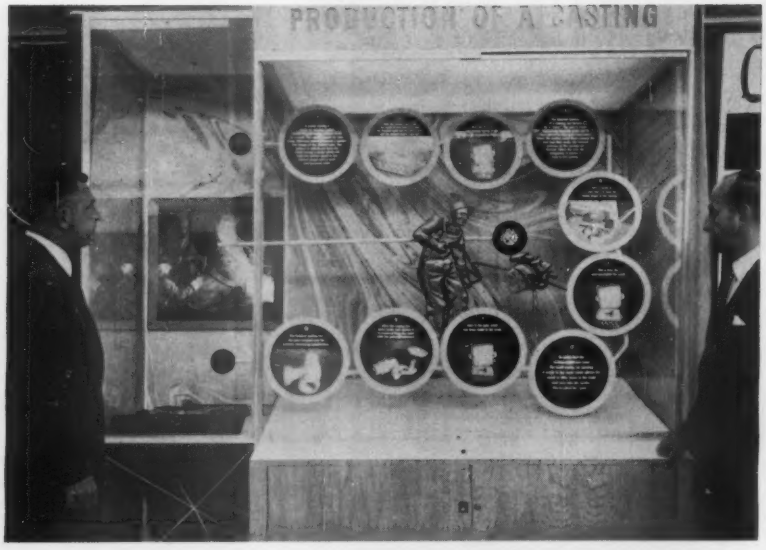


Casting quality control, featuring an operating model betatron, is shown in the Esco display



Architect's rendition of the Oregon Museum of Science and Industry built on a four-acre site

Foundry Processes Portrayed
. . . . at Oregon Museum



The Oregon Chapter, AFS, exhibit shows procedures in producing a casting. Museum Director Doug Ruegli, right, pushes button to actuate display

OREGON Chapter of the American Foundrymen's Society and Electric Steel Foundry Co., Portland, Oreg., have provided displays at the new Oregon Museum of Science and Industry. The chapter's exhibit uses color transparencies to portray the step-by-step production of a casting. Esco's display also employs transparencies depicting quality control and nondestructive testing of castings.

The museum, situated on 4 acres of land adjacent to the new Portland Zoo and Arboretum, was financed and built through the combined efforts of labor, management, business firms, professional people, and school children. Their contributions of money, materials, and labor made possible construction of the $600,000 project for less than one-third that amount.

On two occasions Oregon Chapter donated $1 per member to the museum's building fund. Members of the Swigert family donated $50,000 in honor of the late Charles F. Swigert, Esco's founder. A wing of the museum has been named the Charles F. Swigert Hall of Science and Industry.

Accompanying photos by courtesy of Paul Fillinger, Electric Steel Foundry Co.

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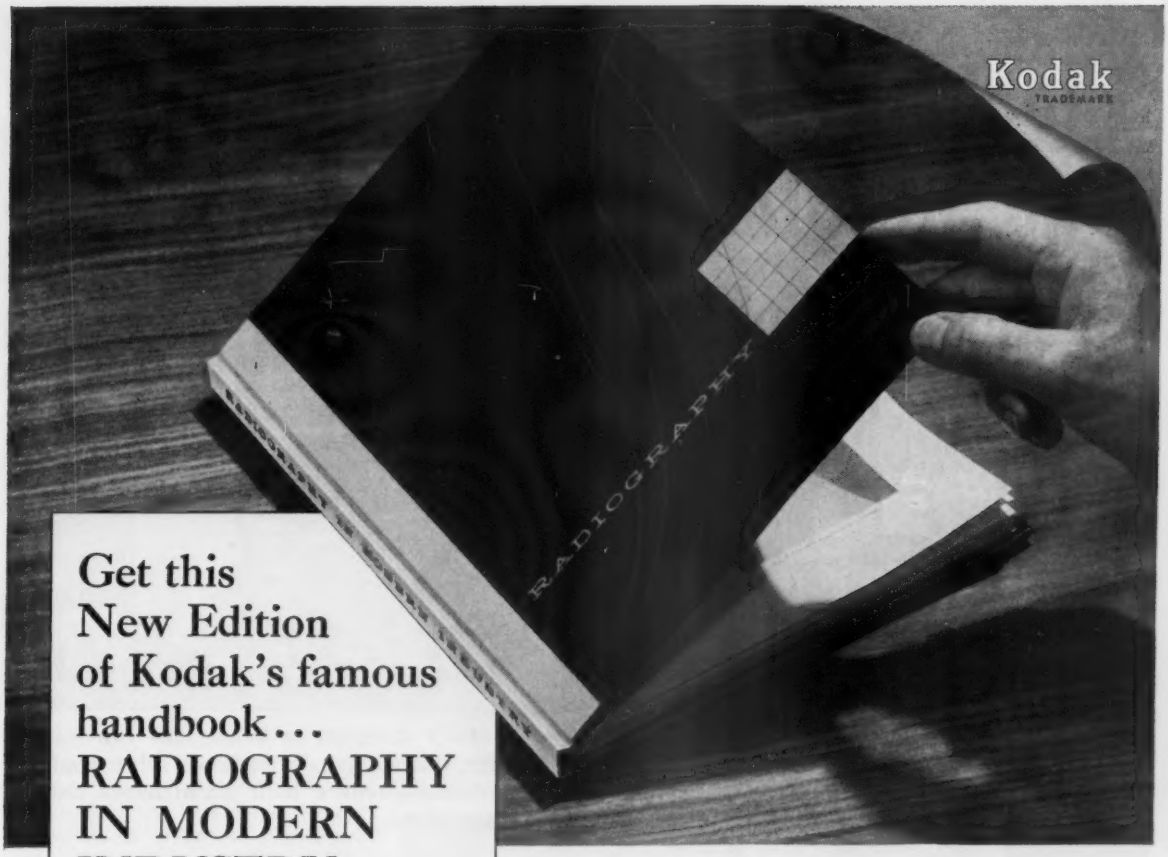
badly when there are a number of men who can remember when no respectable woman used cosmetics.

These are some of the things I think about when I use the word "merchandising."

Now, I may be mistaken, but I am inclined to believe that foundrymen have been so busy improving their casting art and technique that they have not given much thought to merchandising. They have let the customers write the specifications rather than dream up improved specifications which the customers would never think of. Traditionally, foundrymen have followed the thinking of their customers. Perhaps it is time they steal the puck from the customers, and do some trick skating on their own. Perhaps it is time to take the offensive instead of accepting what they can get.

The Man for Merchandising— Now, what kind of man does the foundry industry need for merchandising? For one thing, he should be a man who knows castings, casting technology, metallurgy, and the mechanics of materials. It will be well for him to be an engineer; at least he should think and talk like one. He has to do business with engineers.

I believe the foundry industry should retire the sales fellow who pays routine visits to purchasing agents and take on the man who



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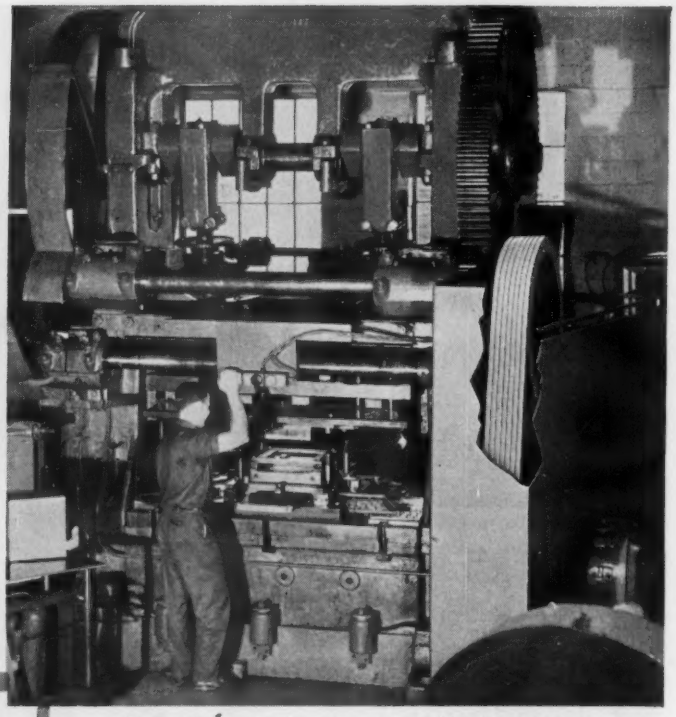
Circle 613 on Page 131

Shock loads no problem for Super V-Belts on punch press



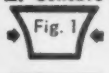
Severe shock loads, which caused standard V-belts to fail, were no problem for Gates Super Vulco Ropes on this punch press.

No other V-belt has ALL these advantages

1. Flex-Weave Cover (U. S. Pat. 2519590)

A Gates exclusive: provides greater flexibility . . . prolongs belt life . . . helps deliver more power to driven machine.

2. Concave Sidewalls (U. S. Pat. 1813698)



Note the concave sides shown in Fig. 1. As belt bends, concave sides become straight, making uniform contact with sheave goove (Fig. 1-A). Even contact means uniform wear . . . far longer belt life.

3. Tough, resilient Tensile Cords

Super strong and resilient; provide 40% greater horsepower capacity . . . easily absorb heavy shock loads . . . reduce number of belts required, save weight and space.

4. High Electrical Conductivity

Built into Gates Super Vulco Ropes for safer drives (in explosive atmosphere).

5. Oil, Heat, Weather Resistant

Made with special rubber compounds, Super Vulco Ropes stand up longer under all conditions.

TPA 315

Gates

World's Largest Maker of V-Belts

Especially designed to handle the heaviest shock loads, Gates Super Vulco Ropes solve tough drive problems—reduce both maintenance and replacement costs.

For example: Mr. Daniel Rusinow, president of the R & D Manufacturing Co., Detroit, Michigan, needed to improve efficiency in a 250-ton punch press. The press was originally driven by flat belts, but these slipped and proved unsatisfactory.

Mr. Rusinow first replaced the flat belt drive with standard V-belts, but the severe shock loads of the punch operation caused the belts to fail.

A superior shock-absorbing drive was needed—the local Gates Field Engineer was consulted, and Super Vulco Ropes recommended for the job.

Mr. Rusinow commented, "After our experience with other V-belts, I did not believe it possible to design such an excellent drive, but Gates engineering service and Super V-Belts proved the right answer to the problem."

● **Drive data and design assistance are quickly available to you. Simply call your nearby Gates distributor. Gates V-Belt stocks are carried in all major industrial centers.**

The Gates Rubber Company
Denver, Colorado

Gates Super VULCO ROPE Drives

40% more Horsepower Capacity

sits for hours with the customers' engineers and researchers, and goes over with them preliminary designs, pilot projects, and experiments.

It may be that the foundry merchandising man should know more about the customers' industries than his own.

Five or ten years' foundry experience would be good for the merchandiser but he won't have the time. He has to learn too many other things which are more important.

He must know all about salesmanship, advertising, psychology, all the smart modern techniques for capturing and holding the attention and good will of customers. Here I am talking about basic selling procedures, not about entertainment and barroom rituals.

He must know how to speak and write clearly, convincingly, and simply. He must know how to talk to engineers, individually and in engineering meetings. Incidentally, it is better for foundrymen to give speeches before engineering societies than before foundry societies; there is no use preaching to those who are already converted.

He must know how to get along with all kinds of people. Particularly, he must know how to do business with foundry operators. That won't be easy. Foundry staffs have always prided themselves on being plain folks, homespun. They won't like the merchandiser at first. He will be too sophisticated, too Madison Avenue, too Ivy League. Besides, they will hate the merchandiser because he is making too much money.

So the merchandiser may have his hands full of superintendents, shop managers, and perhaps even owners. But the world is changing and the merchandiser himself may help to change it. There is nothing homespun about a nuclear-powered oil tanker or a guided missile.

Technical Institutes — If my appraisal of the situation is any good, the foundry industry needs still another type of man besides the researcher and the merchandiser. The industry needs the kind of man who is trained in a two or three year technical institute program. The industry needs furnace men, instrument men, laboratory technicians, draftsmen, testers, inspectors, maintenance men, foremen, and others who fit between the craftsmen on the one hand, and the engineers, executives, and scientists on the other.

One reason the industry needs these men is because too many engineers are doing technician work which is beneath their capacity. This situation makes them unhappy and destroys their morale. They feel they could do more important and more difficult tasks.

I should like to say something about the technical institutes, about their kind of instruction, and about their potential for service to the foundry industry. However, the American Society for Engineering Education is now studying technical institute education under a handsome grant from the Carnegie Corporation. The report should be out shortly and will provide the latest and most authoritative information on this subject.

Conclusion — I am thoroughly convinced that if the foundry industry—indeed, any industry—will not closely follow and conform to scientific progress and research, and will not merchandise intelligently and energetically, that industry is already on the floor and hearing the count of five or six.

HAWLEY

Trav-L-Vent

"Moves with the job"

eliminates big, expensive area ventilating systems

exhausts toxic fumes at any pouring point

NEW! *First and only* real solution to non-ferrous foundry ventilating problems. This mobile ventilator attaches to bail of any ladle . . . traps and exhausts harmful fumes during pouring operation. Protects workers...eliminates "zinc shakes" and other health hazards . . . improves working conditions.

HAWLEY TRAV-L-VENT has same lateral and lengthwise travel as any bridge crane . . . installs at less than ⅓ the cost of inefficient conventional systems . . . uses as little as 1500 cfm. Proved in operation at such foundries as Ford Meter Box Company, Allis Chalmers, Langsenkamp-Wheeler, Hersey Manufacturing Company, Northern Indiana Brass, Robertshaw-Fulton and many others. *Will fit your foundry layout.*

Write for complete information to Martin Equipment Company, Box 173, Wabash, Indiana

HAWLEY MANUFACTURING COMPANY • WABASH, INDIANA

applied experience

by OSBORN

. . . start of an efficient foundry operation

Operating a profit-producing foundry today takes a thorough knowledge of methods and equipment . . . it takes ground-level know-how to cut costs, speed production and still produce *quality* molds and cores. This is the kind of *applied experience* Osborn offers you.

The time is *now* . . . when your foundry plans are in the "creative stage". It's the time to get the full benefit of Osborn's *advanced thinking* . . . advanced methods and equipment designed to *boost your foundry's efficiency.*

Call on Osborn . . . where a bonus of over 50 years *applied experience* and technical know-how can work together to help *lower your costs.*

At no obligation, our staff of Foundry Engineers will work with you . . . study your molding and core-making methods . . . help you develop the *best combination* to improve your foundry operations.

Write for full details. *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Circle 616 on Page 131

Industry Briefs

BLAW-KNOX CO. will convert its Buflovak Equipment Div. foundry in Buffalo to additional manufacturing space which will add 30 per cent additional area to this type of manufacturing. Black-Clawson Co., Hamilton, Ohio, has been licensed to manufacture Buflokast cast-iron vessels, and Samuel Appelby, of the Buflovak organization, will handle sales and service of the new product line.

Vulcan Mold & Iron Co. has completed a $500,000 expansion program which raises its capacity by 40,000 tons to 185,000 tons yearly. Major tonnage increase has been at the Lansing, Ill., plant, now rated at 90,000 tons annually. Additional installations to expand the manufacture of molds for consumable electrodes are planned at the Latrobe, Pa., plant.

Grede Foundries Inc., Milwaukee, has acquired an idle foundry property there from Cutler-Hammer Inc. for an estimated $89,000. Intentions are not to operate the foundry, but such equipment as can be used will be moved to Grede foundries in the Milwaukee area.

F. J. Stokes Corp., Philadelphia, has offered facilities of its vacuum metallurgy laboratory for use by outside firms at nominal cost. Facilities include an induction-heated vacuum melting furnace with a crucible capacity of 17 lb and capable of handling ingots up to 15 in. high by 10 in. in diameter. A. D. Garwood, manager of Stokes vacuum furnace department, is in charge of the laboratory.

American Automation Corp. has changed its name to International Automotion Corp. Its address remains 121 Huron View Blvd., Ann Arbor, Mich. The company specializes in foundry consulting and application of the Buhrer automated foundry system.

Alloys & Chemicals Mfg. Co., Cleveland, has appointed Sipi Metals Corp., 1720 Elston Ave., Chicago, 22, to distribute its aluminum alloy ingots. Sipi warehouses are in Chicago, Detroit, Minneapolis, and Erie, Pa.

Pyle-National Co., Chicago, has contracted to acquire Steber Mfg. Co., Broadview, Ill. Steber will continue operations as a division of Pyle-National.

Blaw-Knox Co., Pittsburgh, will market refractory products under its own name. The company has signed distributor agreements for refractory products manufactured by the following companies: Wellsville Fire Brick Co., Wellsville, Mo.; Cambria Fire Brick Co., Davis Fire Brick Co., and Sivad Ceramics Corp., all of Oak Hill, Ohio. Major products to be handled by Blaw-Knox will include high-alumina and high-grade fire and silica brick, including all shapes, and a complete line of plastic cements and castable products.

J. F. Quest Foundry Co. will sell its foundry at 900 South Fourth St., Minneapolis, and move into the plant of the Shakopee Foundry Co., Shakopee, Wis., which was acquired in 1954, and which is being modified to accommodate Quest foundry operations. J. E. Quest is president of Shakopee Foundry.

Shell Process Inc., West Springfield, Mass., has appointed A. C. Christensen Sr., and his son, A. C. Christensen Jr., sales representatives to cover northern Illinois and Iowa, with headquarters in Chicago. The Christensens have been representatives in the same territory for National Engineering Co., Chicago.

Pittsburgh Coke & Chemical Co., Pittsburgh, has resumed full production in its reconstructed No. 2 battery of 35 coke ovens at the Neville Island plant. New construction, costing about $3 million, brings to near completion the company's rebuilding program for its coke ovens. The new battery will have a coal carbonizing capacity of 355,000 tons a year, yielding approximately 255,000 tons of coke.

American Air Filter Co., Louisville, Ky., has moved its New York branch office and eastern regional office to 292 Madison Ave., New York 17. William F. Peters is manager of the New York branch office. Telephone number is Oregon 9-0424. C. J. Gaspar is manager of the eastern regional office. Telephone number is Oregon 9-6844.

Pittsburgh Steel Foundry Corp., Glassport, Pa., and its **Fort Pitt Steel Casting Div.**, McKeesport, Pa., have appointed A. T. McKee & Son, 77 Lowell Rd., Kenmore 17, N. Y., sales representative in New York State west of Schenectady. The new agency includes A. T. McKee, formerly vice president, and his son,

NEW PLANT: Tamms Industries Co. has moved into this new plant situated south of 47th Street in McCook, Ill., a Chicago suburb. Its 40,000 sq ft will be used for manufacturing Tamms products and warehousing items for distribution. Modern laboratory facilities also are included. The company's general offices are situated at 228 North LaSalle St., Chicago

Costly Copper Components Restored to FULL EFFICIENCY

ELECTRODE HOLDERS, BUS TUBES, CABLE CLAMPS RENEWED BY PATENTED PROCESS AT SUBSTANTIAL SAVINGS

A major economic factor in the operating cost of electric arc furnaces is the expense of replacing costly copper components—electrode holders, bus tubes, cable clamps. To reduce your costs, Wilson Welding Company has developed an exclusive patented process for rebuilding, renewing and restoring these components to original specifications, to give performance and life expectancy *guaranteed* to equal that of a new unit, at *substantial savings* to you.

Steel plants and foundries throughout the United States and Canada have reduced down time and saved literally thousands of dollars by taking advantage of Wilson Welding Company's exclusive process. In many cases modifications and design changes to customers' requirements have been made.

You will want to know more about Wilson Welding Company's service. A letter or phone call will bring you detailed data promptly.

BEFORE REBUILDING, this electrode holder was badly burned, pitted and scarred, its efficiency impaired, with resulting higher operating costs. Concealed damage, not always apparent, was revealed when rebuilding began. In every case, cooling tubes are checked for leaks, and every rebuilt holder is subjected to thorough inspection and testing.

AFTER REBUILDING, the electrode holder shown at top looked like this. Its performance will be equal to or better than that of a new one. In this case a smooth contact surface was desired, but surfaces can be serrated, dimensions modified, and other design changes incorporated when desired. Work was completed and shipment made within five days after receipt of the damaged holder. Cost of restoring this holder was less than half replacement cost.

WW CO INC

Wilson Welding Company, Inc.

COPPER AND COPPER ALLOY WELDING

Now serving 200 steel mills and foundries throughout the United States and Canada

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221 HIGH STREET
ALTIZER ADDITION
HUNTINGTON, WEST VIRGINIA
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Circle 617 on Page 131

No air pollution code . . . no in-plant dust or fume control problem too tough for Wheelabrator Collectors

99+% Collection Efficiency Proven in 38 Electric Furnace Installations

Meeting the requirements of stringent air pollution codes is no easy job when you're dealing with such a troublesome and variable a problem as electric furnace fume. The one collector with a record of approval all over the country is the Wheelabrator Dustube cloth-tube type collector. Twenty-six prominent plants are now ventilating 38 furnaces with Wheelabrator collectors. Efficiencies of 99% and higher are being achieved. Thus Wheelabrator Corporation has the background and experience to access the variables and economically solve your specific furnace control problem.

Send for Catalog No. 553-D

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CORPORATION

Canadian Offices: Scarborough (Toronto) — Montreal
505 South Byrkit Street Mishawaka, Indiana

Circle 618 on Page 131

Gerald T. McKee, formerly sales manager, Strong Steel Foundry, Buffalo, N. Y.

Machinery Mart, 215 Brookpark Rd., Cleveland 9, has been appointed distributor by Kwik-Mix and Koehring Div., Koehring Co., Milwaukee. Included in the company products to be distributed by Machinery Mart are power cranes, shovels, clamshells, mixers, and the Moto-Bug material handling unit made by Kwik-Mix. James Cottrell is manager of Machinery Mart, a department of Strong, Carlisle & Hammond.

Baker Perkins Inc., Saginaw, Mich., will discontinue its gray iron foundry operations. Foundry equipment will be disposed of and the space will be converted to accommodate manufacturing activities of Petersen Oven Co., Franklin Park, Ill., which recently merged with Baker Perkins. Petersen production operations will be transferred to Saginaw.

Eutectic Welding Alloys Corp., Flushing 58, N. Y., has opened a new warehouse-service center at 206 West Mound St., Columbus, Ohio. V. J. Ridgway is manager.

Trojan Div., Yale & Towne Mfg. Co., Batavia, N. Y., has appointed Scott Machinery Inc., U. S. Route 3 (North), Concord, New Hampshire, to distribute its tractor shovel line in New Hampshire. Sierra Machinery Co., 307 Morrill Ave., Reno, Nev., has been named Trojan distributor for northern Nevada, and parts of California.

Air Reduction Sales Co. has completed expansion of its oxygen producing facilities at Lorain, Ohio. It boosts daily capacity from 40 tons to about 100 tons.

Black & Decker Mfg. Co., Towson, Md., has opened a new sales warehouse at Guaymas No. 33-2, Mexico City, Mex. Offices of the company have been established in the building and the Mexico City service branch will be located there. Jesus Mendoza continues as Mexican sales manager.

Industrial Heating Equipment Association reports that July orders for industrial furnaces totaled $5,169,000, the largest volume in ten months. June total was $3,672,000. New business for the first seven months was $22,971,000, off 52 per cent from a year ago.

"3/4 pint of Cities Service Core Oil to 240 pounds of sand"

Short baking time, excellent shakeout

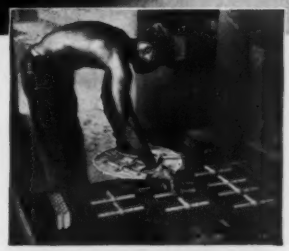
Model Brass Company of Decatur, Illinois produces 50,000 pounds of brass castings a month, mainly pump parts demanding the greatest precision in the making of cores.

That in itself would require an excellent core oil. But in addition, "90% of the castings made today are shipped tomorrow," according to General Manager Charles T. St. Clair.

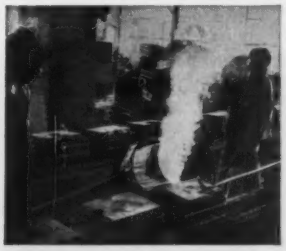
"That means we've got to have an oil with the fastest possible baking time and clean, quick shakeout properties.

"For these purposes, we've never seen the match of Cities Service Delco #62 Core Oil. And most unusual of all is the fact that such a small quantity of the oil goes such a long way. We actually use only ¾ of a pint of Cities Service Delco Core Oil for every four pans or 240 pounds of sand!"

When the jobs are tough and the time is short—that's the time for Cities Service Core Oils. Find out what they'll do for you. Talk with a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, 20 North Wacker Drive, Chicago 6, Illinois.



Cores are placed in position before the pour. Model Brass is able to quick-bake its cores, maintain precision, and speed production with Cities Service Core Oil.



Made with 85-5-5-5 Brass, 90% of Model's castings are pressure tested. They've got to be good, and so has the Cities Service Delco Oil used in the cores.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

Circle 619 on Page 131

Greenlee Core Machines in Greenlee Foundry

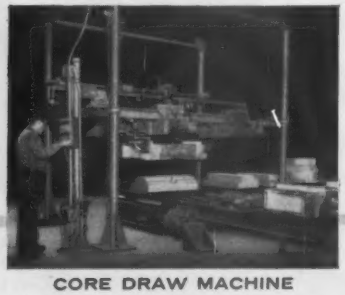
Foundrymen: Mechanize your Core Line Production with GREENLEE Core Rollover and Draw Machines

. . . Increase daily core production
. . . Reduce box and core damage
. . . Permit use of lighter, less expensive core boxes

Greenlee Core Rollover and Draw Machines pay large dividends in high speed, economical core line production. These machines are capable of handling 50 cores per hour. Compare your present method with this production time! Greenlee Core Rollover and Draw Machines provide the flexibility needed for large and small core production.

Standardization of core box sizes is unnecessary . . . use your present boxes. Lighter, inexpensive core boxes can be used because hammering, crane handling and log chain damage is eliminated. Greenlee Core Machines can help you produce better cores faster, more economically.

CORE ROLLOVER MACHINE
Clamp, rollover and roll back cycle time is 45 seconds.



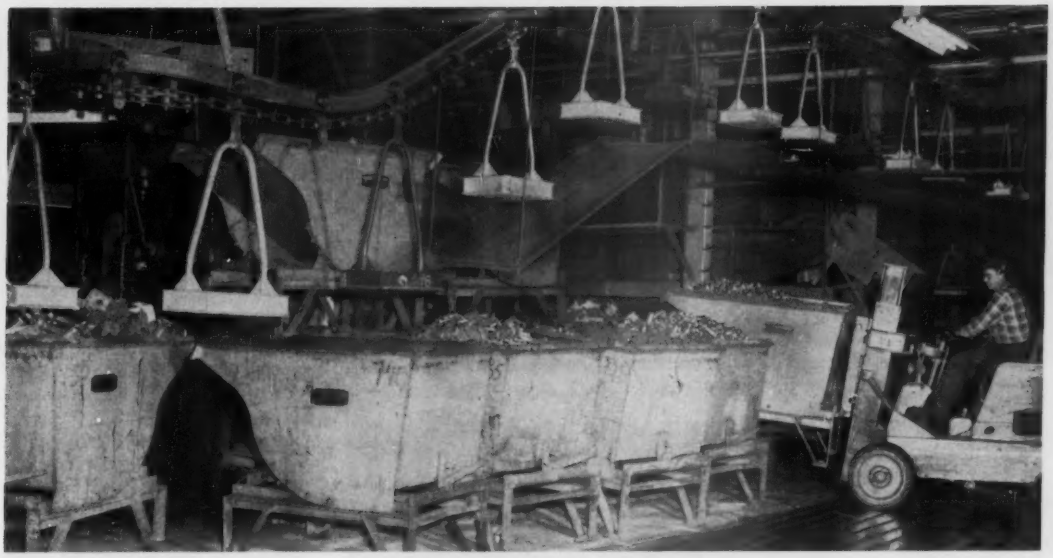
CORE DRAW MACHINE
Positions, clamps, vibrates, draws core boxes to 32" deep in 80 seconds.

WRITE FOR BULLETIN F-101 — YOU'LL GET COMPLETE DETAILS ON GREENLEE CORE MACHINES

Machines designed with the future in mind.

GREENLEE BROS. & CO.

2225 MASON AVE.
ROCKFORD, ILLINOIS



In-process storage of castings is made easy with self-dumping storage

Hoppers and Trucks Provide
Efficient Material Handling

AUTO Specialties Mfg. Co., St. Joseph, Mich., has developed an efficient system in its malleable iron foundry for moving as many as 50 different kinds of castings daily through numerous processing stations without bottlenecks and with a minimum of labor.

Each casting must be routed through finishing and treating processes according to its specifications. To accomplish this movement, the foundry relies on the principle of "mass handling"—moving as much bulk as possible in one operation—but tailors the principle to meet the varied handling requirements of custom processing.

Self-dumping hoppers, transported by fork trucks, are the handling tools used. Full of castings, hoppers pull in and out of process lines as integral parts of the production system, moving through the plant according to the routing required by the parts in them.

Mobility Is Key—Generally, hoppers are loaded as castings come off work stations. When a hopper is full, a fork truck takes it to the next station. Hoppers thus become highly mobile containers carrying hot or cold, large or small, raw or finished castings. They may carry a given load a few yards or a quarter-mile. They may unload immediately or be stacked for in-process storage.

At some work stations, hoppers may be emptied piece by piece by workers as they perform the next operation on each casting. At other stations the hoppers may be emptied completely at once. This is done simply by releasing a lock-handle on the rear of the hopper. It dumps it-

Parts moving on conveyor line drop into hopper for transfer to station for succeeding operation

Fork truck places loaded hopper of castings on a platform scale. Weighing can be done rapidly

Snag grinder operators toss ground castings into hoppers for handling by truck

self, returns to an upright position and automatically locks.

Aside from mobility, savings in storage are achieved with the hoppers because they can be stacked easily. Many operations at Auto Specialties run on a two-shift, five-day week, but some heat-treat furnaces must operate round the clock seven days a week. Castings are stored during the week in stacked hoppers so they can feed the furnaces during graveyard shifts and through the weekend.

Another advantage of the hoppers is that they provide a convenient means of weighing castings for inventory controls. At any point on its route through the foundry a hopper of castings may be dropped on the scale by the fork truck carrying it. The truck backs off while the weigh is made, then picks up the hopper and continues on its way, usually in less than 15 seconds.

Auto Specialties bought its first six hoppers eight years ago. They are still among the 300 hoppers, all manufactured by Roura Iron Works Inc., which the company now uses. Of these, 215 are assigned to in-process handling of piece parts, 70 are used for storing parts overnight or longer, and 15 catch production waste and scrap.

Begins On Pouring Floor—The trip a typical casting may take begins on the pouring floor. At the shakeout station castings are put on a conveyor belt as soon as they can be removed from molds. While still on the conveyor, sprues and risers are knocked off with sledges and thrown into hoppers while still at 900° F. When each hopper is full, it is carried to the sprue heap and dumped. The scrap is remelted with new metal.

After heat treating, pots are set in a cradle and castings dumped into a hopper

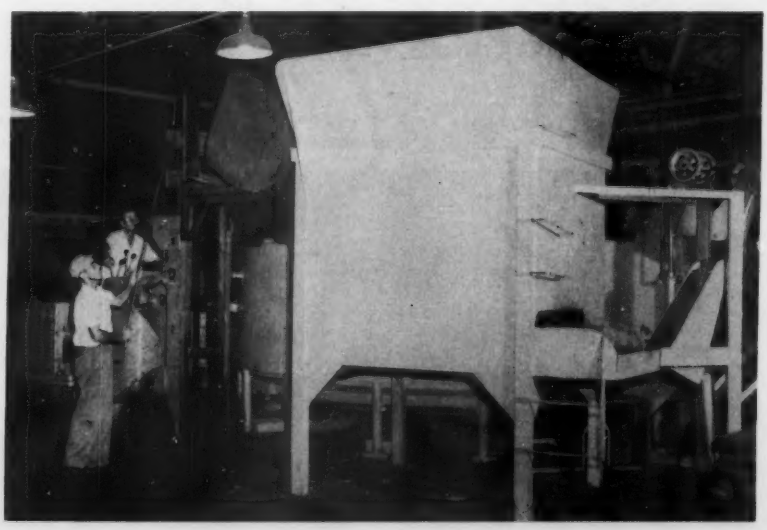
As castings move along on the belt they pass over another shakeout. Here excess sand drops into a hopper, which is replaced when it is filled.

The castings continue on to a sorting belt. Workers flanking the belt pull off castings, which are still hot and weigh 30 to 50 lb, and sort them into specific hoppers. The end of the sorting belt discharges leftover sand, sprues, and risers into another hopper.

From the sorting belt, each hopper goes its own way according to the parts it contains. They may be delayed for storage indoors or outdoors. (Some hoppers have holes drilled in the bottom to drain rain and snow.) Eventually, hoppers carrying hard iron castings from the sorting belt deliver their load to the annealing furnaces. In going through an annealing furnace the castings are carried on a belt that discharges them, at a temperature of 1250° F, into another hopper. From here, the castings may go to a shot blast cleaner, then onto a belt going to snag grinding stations. As each part is finished, the operator tosses it into another hopper.

The hopper next may go to hydraulic presses, where certain castings are straightened.

In the production of pearlitic malleable iron, castings are handled in pots during heat treatment, then are emptied into hoppers. The company developed a special rig to empty the pots, thus eliminating an-



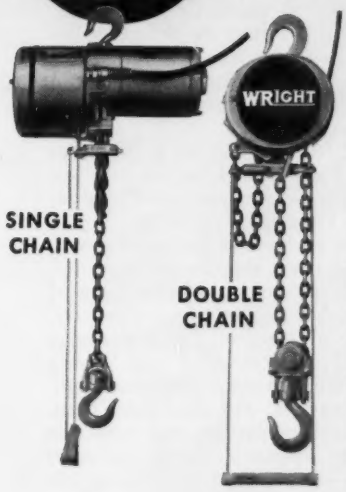
Hopper drops castings into bin for feeding to heat treat oven. Release lever on the hopper is tripped with a push rod

Circle 621 on Page 131→

WRIGHT HOISTS & CRANES

ACCO

FOR LONGER LIFE • EASIER MAINTENANCE
LOWEST FINAL COST



NEW...

WRIGHT Electric Chain Hoists

LIGHT - COMPACT - RUGGED - LOW COST

Two capacity ranges as pictured—
Single Chain 300 to 2000 lbs. Double Chain 3000 to 4000 lbs.

• Long Life—Safety—Minimum Maintenance are assured by these sound features: Wick Oiling of Load Chain gives a working life many times greater than dry chain...Fewest Moving Parts of any chain-type electric hoist cuts maintenance...Alloy Steel Load Chain is heat-treated for long-wearing surface, with ductile core to resist shock loads—side-pull won't break this flexible chain...Load Wheel, Hooks and Hook Couplings are drop-forged alloy steel...Precision Ball Bearings, and gears operating in oil bath, increase efficiency and lengthen life...Double Braking gives maximum Safety. Worm and Gear Drives serve as simple, positive Load Brake, and there's a big, efficient Motor Brake, easy to adjust for lining wear. For complete information, write York, Pa., for **Bulletin DH-73.**

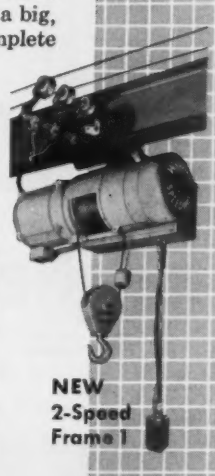
WRIGHT *SPEEDWAYS*—Capacities ¼-ton to 10 tons

FRAME 1, FRAME 1½, FRAME 2, FRAME 3

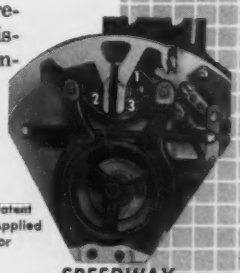
• The New 2-Speed Frame 1 WRIGHT *Speedway* pictured here has a 2-speed motor... 1800 RPM for fast lifting and lowering...450 RPM for slow, gentle positioning of production work. It's ideal for foundries and machine shops. Capacities ¼-ton to 1 ton.

WRIGHT *Speedway* features make them your best buy for production work: The Motor Brake pictured here is an outstanding feature of WRIGHT *Speedways*. It's foolproof! No adjustment for springs or solenoid ...*Nothing to Adjust but the Cam!*

Other WRIGHT *Speedway* features: Perfect balance for smooth running...NEMA 30-minute motors for heavy-duty work...best available electric controls...heat-treated alloy steel gears, pinions and shafts have hard-wearing surface, ductile cores for shock resistance...splined connections minimize distortion...precision ball or roller bearings insure efficiency, low maintenance...gears and gear shaft bearings splash-lubricated in gear housing...Weston-type load brake ...all suspensions—lug, hook, base mountings or Timken trolleys.



NEW
2-Speed
Frame 1



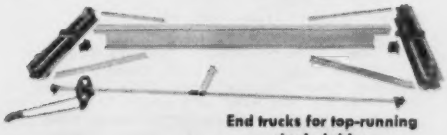
Patent Applied for

SPEEDWAY
MOTOR BRAKE
Nothing to adjust but the cam!

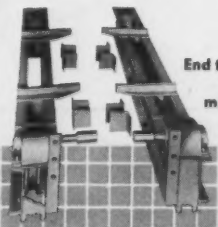
WRIGHT END TRUCKS AND CRANE DRIVE UNITS

Build Better Cranes... Save Money too!

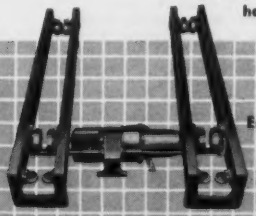
• WRIGHT Motor-Driven Cranes, Hand Traveling Cranes, End Trucks, Drive Units and Trolleys are available in a wide range of sizes and capacities to meet every overhead material-handling requirement. Write our York, Pa., office for literature and information on the equipment you need.



End trucks for top-running single-bridge hand-traveling cranes



End trucks for top-running double-bridge motor-driven cranes



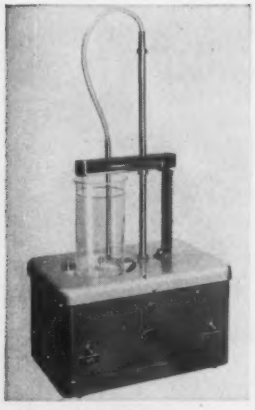
End trucks and drive units for underhung cranes

Wright Hoist Division
AMERICAN CHAIN & CABLE

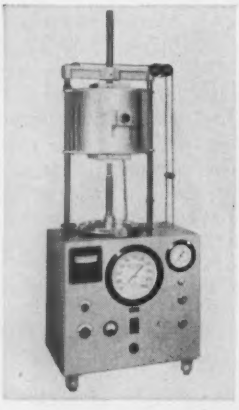
York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ENJOY THE BETTER THINGS OF LIFE

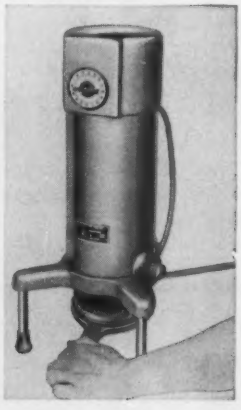
Why overwork yourself? Dietert-Detroit Sand Control Units can help you PRODUCE *BETTER CASTINGS* AT *LOWER COSTS* IN *LESS TIME*.



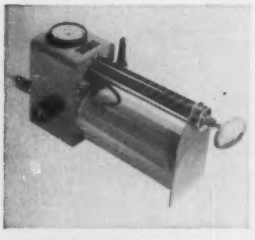
AUTOCLAY . . . No. 513
Saves operator's time in running A.F.S. clay substance test. Better castings and easier molding result from sands with controlled clay content.
To obtain better casting finish, improve sand grain distribution, control fineness.



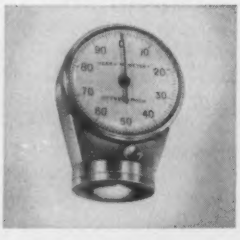
THERMOLAB . . . No. 785
For clean castings, free of defects. Test and control the high temperature properties of your molding materials with the Dietert-Detroit Thermolab. Reduce or eliminate scabs, cuts, etc.



MOISTURE TELLER . . . No. 276
Control moisture content in your molding sands and you will control the greatest variable causing defects in any foundry. The No. 276 takes but a few minutes to check moisture content.



RAGONE . . . No. 4210
Measure fluidity of ferrous and nonferrous metals in seconds. Take the guess-work out of pouring requirements—know when your metal will flow properly to fill the mold.



MOLD HARDNESS TESTER . . . No. 473
Molds too soft? Rough surface can result. Molds rammed too hard? You may get rat-tailed or buckled castings. Be sure your molds are properly rammed, use the No. 473 Hardness Tester.

MOTOR DRIVE . . . No. 401
Eliminate the human variable of hand loading . . . equip your hand-operated sand strength machine with a No. 401 Motor Drive.

DIETERT DETROIT
HARRY W. DIETERT CO.
9330 Roselawn
Detroit 4 Michigan

HARRY W. DIETERT COMPANY
Gentlemen: Rush me data on the following:

☐ Autoclay No. 513
☐ Thermolab No. 785
☐ Moisture Teller No. 276
☐ Ragone No. 4210
☐ Mold Hardness Tester No. 473
☐ Motor Drive No. 401

Name_____
Company_____
Address_____
City_____ State_____

other manual chore. It consists of a cradle-like device which pivots near the top and has a hook near the bottom. By fitting the hook, the pot is swung up so that castings spill into the hopper.

From heat treating, some castings may go on to the paint line. Here castings are pulled from hoppers to be hung on paint line conveyors, and after painting are picked off the conveyor and thrown into hoppers again. Other castings may go on to magnetic particle inspection, still in hoppers.

The final station for all castings is the loading dock, where they are dumped into highway trucks for delivery. Here again, the self-dumping feature of the hoppers makes unloading a fast, simple operation.

Only eight fork trucks are required to keep 300 hoppers moving between processing stations. Two trucks take care of parts entering and leaving the grinding room. Two others handle hoppers at the shot blast, straightening presses, and inspection stations. One truck serves the paint line and loading dock. Two trucks work in the hard iron finishing room and one serves the annealing room.

Canadian Foundrymen Plan Their Seventh Conference

Ontario Chapter of the AFS will be host for the seventh All-Canadian Foundry Conference, scheduled for the Royal Connaught Hotel, Hamilton, Ont., Oct. 16-17.

Program details follow:

Thursday, Oct. 16

9 a.m.—**Registration**
10 a.m.—Plant Visitations: Canadian Westinghouse Co. Ltd.; Steel Co. of Canada Ltd.; International Harvester Co. of Canada Ltd.
2 p.m.—**Light Metals vs. Ferrous Metals,** H. E. Gravlin, Chrysler Corp., Detroit.
3 p.m.—**The Third Revolution,** S. H. Deeks, Industrial Foundation on Education, Toronto, Ont.
4 p.m.—**Is Quality Control Old Stuff in the Foundry?** W. K. Bock, National Malleable & Steel Castings Co., Cleveland.
6 p.m.—Cocktail Hour
7 p.m.—**What a Blind Man Sees,** W. H. Bleakley, Abco Inc., Erie, Pa.

Friday, Oct. 17

9 a.m.—**Registration**
10 a.m.—Plant Visitations: Dominion Foundries & Steel Ltd.; McCoy Foundry Co.; Galt Brass Co., Galt, Ont. (Bus for Galt Brass Co. will leave at 9 a.m.)
2 p.m.—**Pouring and Gating of Green Sand & Shell Castings,** J. F. Orloff, Central Foundry Div., GMC, Saginaw, Mich.
3 p.m.—**Science at the Service of the Canadian Foundry Industry,** S. L. Gertsman, Physical Metallurgy Division Mines Branch, Department of Mines and Technical Surveys, Ottawa, Ont.
4 p.m.—**Molding Sand Control,** A. N. Johnston, American Standard Products (Canada) Ltd., Toronto, Ont.
6 p.m.—Reception
7 p.m.—Banquet: **Some Impressions of the U. S. S. R.,** J. W. Kerr, Canadian Westinghouse Co. Ltd., Hamilton, Ont.

CEDAR HEIGHTS BONDING CLAY
A plastic bonding agent produced in No. 8, 12, 16 20, 30, and 50 meshes.

CEDAR HEIGHTS AIRFLOATED CLAY
Highly refined, artificially dried. Ground to 200 mesh.

CEDAR HEIGHTS FIRE CLAY
High in refractory value, smooth clean texture. Produced in No. 8, 12, 16 and 20 meshes.

for better castings

. . . start with clean molds made with sand containing superior Cedar Heights bonding agents.

These super-refined clays from the world's finest clay deposits help to produce molds with higher green strength . . . higher dry strength with a minimum of shrinkage . . . higher hot strength.

Castings peel clean with a fine finish . . . have fewer pinholes . . . less rejects.

For proof of Cedar Heights quality and performance make a test mold in your own laboratory or foundry operation. Contact your distributor or write for free test samples.

CEDAR HEIGHTS CLAY COMPANY

50 PORTSMOUTH ROAD
OAK HILL, OHIO

Circle 609 on Page 131

WHY PAY MORE?

...WHEN YOU CAN BUY

STEEL-TYPE ABRASIVES

$155 for per ton

in 50 or 100 lb. bags Palletizing Available

Beach wear by Jantzen

"SEMI-STEEL" is a newly developed abrasive with steel shot characteristics. It is produced by an entirely new process, so efficiently, that it can be sold at malleable shot prices! "SEMI-STEEL" is manufactured as shot and grit, to S.A.E. specifications. Its performance compares so favorably to that of regular, high grade steel shot that, considering its extremely low price, you can't help but reduce your cleaning costs.

Now you can change to "SEMI-STEEL" abrasives and get a WRITTEN GUARANTEE from Metal Blast that you'll cut cleaning costs — no matter what steel abrasive you're now using! Reports from foundries using "SEMI-STEEL", plus our own laboratory tests, have convinced us that we can definitely guarantee savings in cleaning costs, over any other steel abrasive on the market.

"SEMI-STEEL" IS GUARANTEED TO CUT COSTS

FREE LAB TEST

We invite you to send us a sample of your present steel shot (at least 200 grams). We'll run a test on it, against "SEMI-STEEL", and report the results. Or, we'll gladly send a sample of "SEMI-STEEL" for testing in your own lab. (Give size required.) Either way you'll get welcome proof of "SEMI-STEEL" savings!

So, why continue paying high prices for steel shot cleaning? Write for more information on "SEMI-STEEL" — send in your sample or request our sample for testing. Take this first step toward savings, right now!

METAL BLAST, INC.

872 EAST 67th STREET · CLEVELAND 3, OHIO

THE LARGEST INDEPENDENT MANUFACTURER OF ABRASIVES — STEEL-TYPE, CHILLED AND MALLEABLE

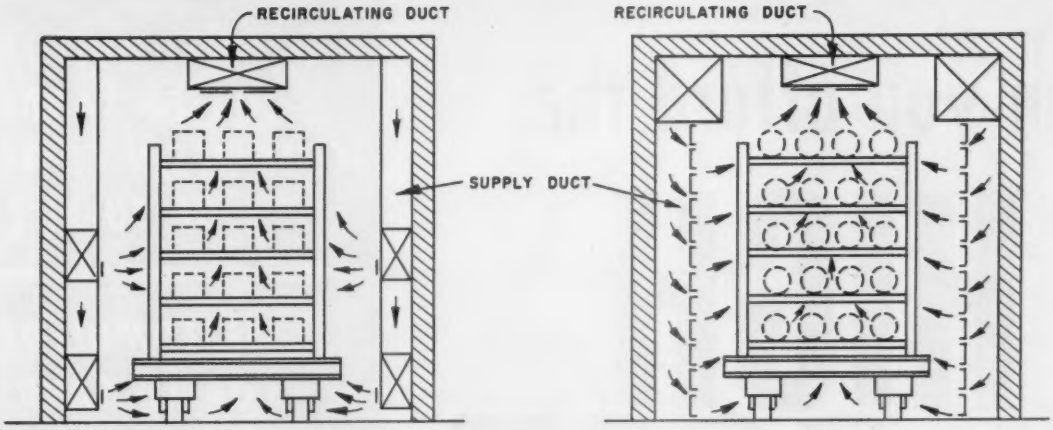


FIG. 1 FIG. 2

Fig. 1—Typical core baking oven. Fig. 2—Oven for baking or heat treating

Adapting a Core Oven to

ALUMINUM HEAT TREATING

By CARL MAYER
President
Carl Mayer Corp., Cleveland

MANY aluminum foundries send castings out to be heat treated, thereby increasing their production costs because of the additional handling and other expenses they incur. These extra costs are particularly unwelcome today when competition is keen and it is imperative for all businesses to perform as many cost-reducing operations as possible within their own plants.

Management of these foundries may not have realized when they purchased their original core baking ovens that with a slightly different duct design they could have had a utility unit that not only would bake cores, but also would heat treat aluminum castings. Because core baking and aluminum aging temperatures fall in the same general range, it is practical to perform at least two operations in a single oven.

There is a difference in design, however, that must be recognized if consideration is to be given to a combination core baking and aluminum aging oven. Close temperature control is required in the aging of aluminum (usually plus or minus 5° F), whereas core baking may be performed with temperature variations of as much as 50 degrees or so. Oven design therefore is the key to the success of a combination unit.

Even though an existing oven was not designed originally to perform the aging operation, it can be converted in most instances. In fact, temperatures for heat treating to as much as 1000° F are possible if the oven shell is of reasonably rugged construction.

Many outdated units now are being revamped, and modern, convection-type, recirculating heating systems are being installed. Updating this obsolete equipment offers several advantages: 1. Purchase of such equipment often may be considered a *business expense* rather than a *capital investment*. 2. Greater flexibility of operations is achieved. 3. Higher operating efficiency is attained. 4. Maintenance and operating costs are reduced sharply. All of these advantages are well worth considering if the ultimate goal is a more competitive product with increased profits.

A typical core baking oven design is shown in Fig. 1, which illustrates the conventional duct system for core baking. Fig. 2 shows the combination core-aging oven. Note the specially designed sidewall duct construction with adjustable air ports from floor to top of load and from front to rear of oven. This arrangement insures better air distribution with close temperature control throughout the load.

Generally, aluminum castings are best heat treated by direct-fired, convection-type, recirculating heating systems, with either gas or electricity employed as the heating medium. Combination gas and oil and straight oil firing also have been used with satisfactory results reported. With the latter, it is best to heat by indirect methods where they are possible.

Core baking and mold drying may, of course, be accomplished with any of the above mentioned fuels, with equally satisfactory results.

In the light of the often predicted boom of the 1960's and existing business conditions, it would seem to be a wise choice to complete the equipment modifications now, in preparation for the big job ahead if we are to be competitive.

In equipment changes of the above nature, it is possible for a foundry to use its own personnel in the installation work, thereby both providing work for otherwise idle help and saving money for the foundry.

can you afford the HIGH COST of uncoated shell sand?

ARE YOU PAYING MORE THAN THE COST OF COATING EQUIPMENT WITHOUT GETTING THE BENEFITS?

Weigh the cost of coating equipment against the savings it will effect in reduced resin requirements, higher production, improved quality, and storage and handling advantages. You will find the savings will quickly pay for Speedmullor coating equipment.

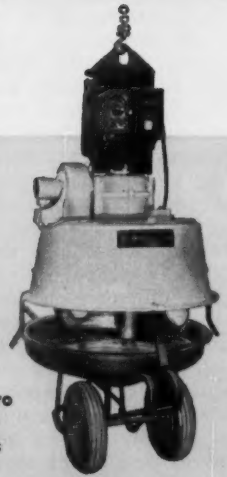
SPEEDMULLOR COATED SANDS CUTS RESIN COSTS UP TO 50%

SPEEDMULLOR COATED SANDS IMPROVE CASTING QUALITY

SPEEDMULLOR COATED SANDS DO NOT DETERIORATE

SPEEDMULLOR COATED SANDS END DUST HAZARD

HP Shell Speedmullor for Hot Process Warm Process Cold Process



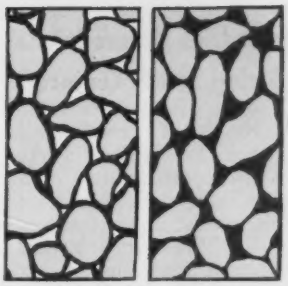
Shell Mulbaro Lowest Cost Cold Process

There is no segregation of resin with Speedmullor-coated sand . . . perfect bond is obtained with a minimum of resin. The microscopic layer surrounding the *coated* grain effects a superior bond with far less resin. CAN YOU AFFORD to use up to twice as much resin and still not obtain maximum physical properties in an *uncoated* mixture?

Speedmullor-coated sands produce stronger, more uniform shells with no gas-forming, segregated resin pockets. The resin is all in a perfect film around the sand grains. Properly *coated* sands provide excellent flowability and moldability, further enhancing quality. CAN YOU AFFORD casting losses because of arching, voids, porosity and blows or gas holes caused by resin segregation in an *uncoated* mixture?

Speedmullor-coated sands are processed for stability. The physical properties of the *coated* sand remain unchanged indefinitely under normal storage conditions. CAN YOU AFFORD costly losses when *uncoated* sands must be discarded because of deterioration in storage? CAN YOU AFFORD the poor casting quality caused when partially deteriorated *uncoated* sands are used?

Speedmullor *coating* eliminates the hazards and drawbacks of dry resin sand mixtures. CAN YOU AFFORD to risk the severe dust and explosion hazard, and air contamination because of the very fine resins used in *uncoated* sand mixtures? CAN YOU AFFORD the expense of using only part of the resin for bonding, losing the rest through the exhaust system?



Left: A microscopic film of resin surrounds each grain of sand in a Speedmullor-coated mixture, effecting a superior bond.

Right: Up to twice as much resin is required to effect a bond in a dry resin sand mixture, and maximum physical properties can't be developed.

SHELL SPEEDMULLOR

FIRST FOR COATED SANDS

FIRST FOR HOT PROCESS

FIRST FOR COLD PROCESS

FIRST FOR WARM PROCESS

CP Shell Speedmullor for Cold Process

Beardsley & Piper Div. Pettibone Mulliken Corp.

PROGRESSIVE FOUNDRIES LOOK TO BEARDSLEY & PIPER FOREMOST DEVELOPER OF FOUNDRY MACHINERY

FEMA

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Use the reader service card inserted in this publication to obtain additional information.

Foundries Reduce Injuries During Safety Contest

Results of the safety contest conducted by National Safety Council, Chicago, from July 1, 1957 to June 30, 1958, show that foundries had an annual injury frequency rate of 8.7. This was a 20 per cent reduction from the previous contest year's rate and the third best reduction in the metals section, covering ten divisions.

Awards to first-place winners will be presented formally at the 46th National Safety Congress, Chicago, Oct. 20-24. Second and third place awards will be available at the congress to winners. Certificates of achievement will be mailed during the week of Oct. 27 to contestants who qualified.

The winning foundries are divided into Group A—units operating more than 520,000 hr, July to October, 1957; Group B—units operating between 202,000 and 519,999 hr, July to October, 1957, and Group C—units operating less than 202,000 hr during the same period. The winners follow:

Group A with an average injury frequency rate of 6.7: Fabricast Div., General Motors Corp., Bedford, Ind., first with a rate of 0.50; American Radiator & Standard Sanitary Corp., Louisville, Ky., second with 1.44, and Johnstown Works, United States Steel Corp., Johnstown, Pa., third with 1.45.

Group B with an average injury frequency rate of 11.19: Dow Chemical Co., Bay City, Mich., and Erie Malleable Iron Co., Erie, Pa., tied for first with no injuries, and Foundry & Mill Machinery Div., Blaw-Knox Co., Coraopolis, Pa., third with 0.98.

Group C with an average injury frequency rate of 12.38: Roll & Machinery Works, United States Steel Corp., Canton, Ohio; East Texas Steel Castings Co., Longview, Tex.; U. S. Pipe & Foundry Co., Decoto, Calif.; Marshalltown Foundry Co., Marshalltown, Iowa; Ideal Foundry Div., Republic Steel Corp., Newton Falls, Ohio; Hammond Car Wheel Plant, Pullman-Standard Car Mfg. Co., Hammond, Ind.; Waukesha Foundry Co., Watertown, Wis.; Railroad Products Div., American Brake Shoe Co., Pomona, Calif., and Robertshaw Thermostat Div., Robertshaw-Fulton Controls Co., Scotdale, Pa., all tied for first place with no injuries.

Certificates of achievement were awarded to the following foundries for reducing their injury frequency rate:

Group A—General Steel Castings Corp., Eddystone, Pa.; Foundry & Mill Machinery Div., Blaw-Knox Co., East Chicago, Ind.; Albion Malleable Iron Co., Albion, Mich.; Lynchburg Foundry Co., Lynchburg, Va., and Shenango Furnace Co., Sharpsville, Pa.

Group B—Los Angeles Steel Casting Co., Los Angeles; James B. Clow & Sons Inc., Birmingham; American Radiator & Standard Sanitary Corp., Bayonne, N. J., and Richmond, Calif.; Kensington Steel Co., Chicago; Lynchburg Foundry Co., Radford, Va., and John Deere Malleable Works, Deere & Co., East Moline, Ill.

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And Link-Belt's vast engineering background assures expert analysis of your requirements. Our foundry specialists will work with you or your consultants. Call your nearest Link-Belt office, or write for Book 2423.

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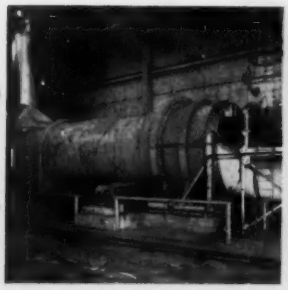
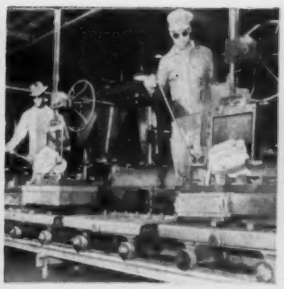


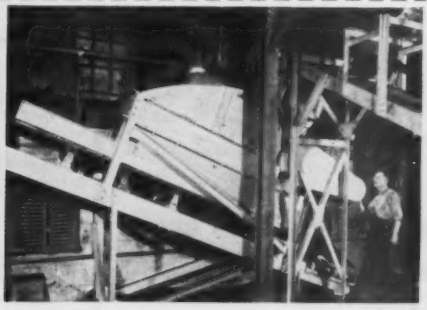
DRYERS — Link-Belt Roto-Louvre uniformly dries and cools large tonnages of sand in small space.



MOLD CONVEYORS — a full line of car, pallet, roller and trolley types meets all operational variations.

BELT CONVEYORS — efficiently move sand. Plows discharge sand to molding stations as required.

SHAKEOUTS — complete line provides high speed, economical separation of sand and castings. Rugged two-bearing vibrator imparts smooth circular motion to all screening surface.



REVIVIFIERS thoroughly aerate molding sand so that it will flow easily . . . assuring even distribution around the pattern. Revolving blades break up any lumps.

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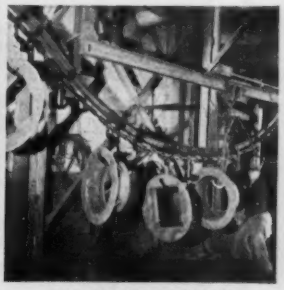

OVERHEAD TROLLEY CONVEYORS economically move cores, molds and castings, with complete flexibility.

WRITE FOR BOOK 2423 —Gives detailed information on Link-Belt's complete line of foundry equipment.

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Group C—Burnside Steel Foundry Co., Chicago; Sibley Machine & Foundry Corp., South Bend, Ind.; Northern Malleable Iron Co., St. Paul; Pacific States Cast Iron Pipe Co., Provo, Utah; Electro-Alloys Div., American Brake Shoe Co., Elyria, Ohio; Liberty Div., Grede Foundries Inc., Milwaukee, and Minneapolis Electric Steel Castings Co., Minneapolis.

GM Institute Foundrymen's Club Holds Annual Banquet

Approximately 285 people gathered in the main cafeteria of General Motors Institute, Flint, Mich., recently for the third annual senior banquet sponsored by the Foundrymen's Club of the institute's student government organization. Supervisory personnel from the corporation's foundries, members of the institute staff, senior students, and other guests were present for the occasion.

E. N. Cole, general manager of Chevrolet Division and GM vice president, was the principal speaker. He discussed the part light metals will play in the auto industry in the future.

Prior to the banquet, an automobile and castings display was open to the assemblage. Castings from several GM foundries were shown. Other exhibits were prepared by the Society of Automotive Engineers and the American Society of Tool Engineers.

Find New Copper Alloy Data

New data have been determined on 16-mechanical and physical properties of copper-base casting alloys 80-10-10, 85-5-5-5, and 88-6-1½-4½ in a research program sponsored by the Brass & Bronze Ingot Institute, Chicago, at Battelle Memorial Institute. Reports on these data are available from the institute, 308 W. Washington St., Chicago 6.

PROPOSALS SOLICITED FOR LEASE OF DEPARTMENT OF THE ARMY INDUSTRIAL FACILITIES

All or portions of the above installations are available for use for commercial purposes. Possible uses are unlimited.

Facilities: Oleum plants (sulphuric acid); nitric acid; acid concentration; ether still; nitrocellulose; various explosive manufacturing; organic chemical manufacturing; steel foundries; heavy and light manufacturing; loading and assembling; offices; warehouses; power plants; storage tanks; many other facilities.

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Labor: There is a surplus of both skilled and unskilled labor in the immediate vicinity of most plants.

Detailed information, arrangements for inspections, invitations for proposals and sample form of lease may be obtained from the U. S. Army Division Engineer having jurisdiction over the area in which you are interested. The addresses of the Divisions Engineers are:

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OHIO RIVER
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NORTH ATLANTIC
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SOUTH ATLANTIC
PO Box 1889
Atlanta, Georgia

NORTH CENTRAL
536 So. Clark St.
Chicago 5, Ill.

SOUTH PACIFIC
PO Box 3339
Rincon Annex
San Francisco, Calif.

SOUTHWESTERN: 1114 Commerce St., Dallas, Texas

MISSOURI RIVER
1. Cornhusker Ordnance Plant, Grand Island, Nebr.
2. Iowa Ordnance Plant, Burlington, Iowa
3. Kansas Ordnance Plant, Parsons, Kansas
4. Lake City Arsenal, Independence, Mo.
5. Nebraska Ordnance Plant, Wahoo, Nebr.
6. Rocky Mountain Arsenal, Denver, Col.
7. St. Louis Ordnance Plant, St. Louis, Mo.
8. St. Louis Ordnance Steel Foundry, St. Louis, Mo.
9. Sunflower Ordnance Works, Lawrence, Kansas

NORTH ATLANTIC
1. Birdsboro Ordnance Steel Foundry, Birdsboro, Pa.
2. Burlington Ordnance Plant, Burlington, N. J.
3. Edgewood Arsenal, Edgewood, Md.
4. Ordnance Assembly Plant, Edgewood, Md.
5. Radford Arsenal, Radford, Va.

NORTH CENTRAL
1. Badger Ordnance Works, Baraboo, Wisc.
2. East Chicago Ordnance Steel Fdy., East Chicago, Ind.
3. Joliet Arsenal, Joliet, Ill.
4. Kingsbury Ordnance Plant, La Porte, Ind.
5. Twin Cities Arsenal, New Brighton, Minn.
6. Wabash River Ordnance Works, Newport, Ind.

OHIO RIVER
1. Coraopolis Ordnance Steel Foundry, Coraopolis, Pa.
2. Indiana Arsenal, Charlestown, Ind.
3. Jefferson Proving Ground, Madison, Ind.
4. Lima Ordnance Steel Foundry, Lima, Ohio
5. Marshall Plant, New Martinsville, W. Va.
6. Ravenna Arsenal, Apco, Ohio
7. Ridgewood Ordnance Plant, Cincinnati, Ohio

SOUTH ATLANTIC
1. Alabama Ordnance Works, Childersburg, Ala.
2. Holston Ordnance Works, Kingsport, Tenn.
3. Milan Arsenal, Milan, Tenn.
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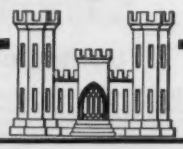
5. Volunteer Ordnance Works, Tyner, Tenn.

SOUTH PACIFIC
1. Pacific Ordnance Steel Foundry, Pittsburg, Calif.
2. Riverbank Ordnance Plant, Riverbank, Calif.

SOUTHWESTERN
1. Lone Star Ordnance Plant, Texarkana, Texas
2. Longhorn Ordnance Works, Karnack, Texas
3. Louisiana Ordnance Plant, Shreveport, La.
4. Oklahoma Ordnance Works, Pryor, Okla.
5. Pantex Ordnance Plant, Amarillo, Texas



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551	566	581	596	611	626	641	656	671	686	701	716	731	746	761	776	791	806	821	836	851	866	881	896
552	567	582	597	612	627	642	657	672	687	702	717	732	747	762	777	792	807	822	837	852	867	882	897
553	568	583	598	613	628	643	658	673	688	703	718	733	748	763	778	793	808	823	838	853	868	883	898
554	569	584	599	614	629	644	659	674	689	704	719	734	749	764	779	794	809	824	839	854	869	884	899
555	570	585	600	615	630	645	660	675	690	705	720	735	750	765	780	795	810	825	840	855	870	885	900
556	571	586	601	616	631	646	661	676	691	706	721	736	751	766	781	796	811	826	841	856	871	886	901
557	572	587	602	617	632	647	662	677	692	707	722	737	752	767	782	797	812	827	842	857	872	887	902
558	573	588	603	618	633	648	663	678	693	708	723	738	753	768	783	798	813	828	843	858	873	888	903
559	574	589	604	619	634	649	664	679	694	709	724	739	754	769	784	799	814	829	844	859	874	889	904
560	575	590	605	620	635	650	665	680	695	710	725	740	755	770	785	800	815	830	845	860	875	890	905
561	576	591	606	621	636	651	666	681	696	711	726	741	756	771	786	801	816	831	846	861	876	891	906
562	577	592	607	622	637	652	667	682	697	712	727	742	757	772	787	802	817	832	847	862	877	892	907
563	578	593	608	623	638	653	668	683	698	713	728	743	758	773	788	803	818	833	848	863	878	893	908
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565	580	593	610	625	640	655	670	685	700	715	730	745	760	775	790	805	820	835	850	865	880	895	910

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561	576	591	606	621	636	651	666	681	696	711	726	741	756	771	786	801	816	831	846	861	876	891	906
562	577	592	607	622	637	652	667	682	697	712	727	742	757	772	787	802	817	832	847	862	877	892	907
563	578	593	608	623	638	653	668	683	698	713	728	743	758	773	788	803	818	833	848	863	878	893	908
564	579	594	609	624	639	654	669	684	699	714	729	744	759	774	789	804	819	834	849	864	879	894	909
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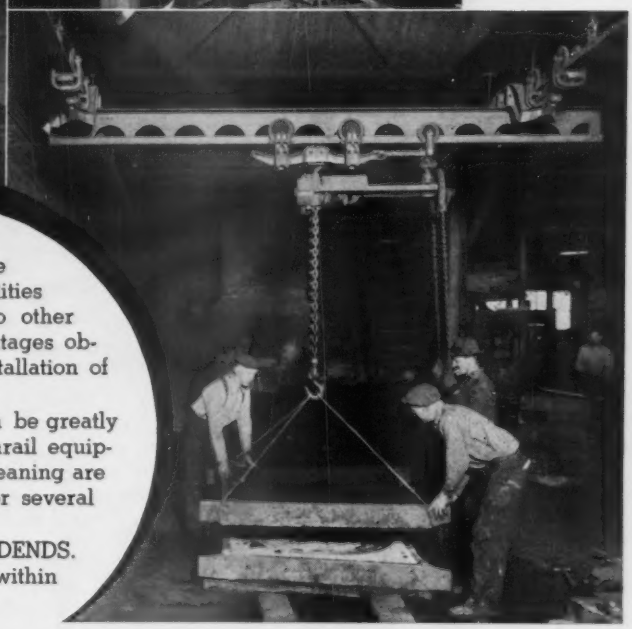
SPEED MOLD-MAKING
the efficient Cleveland Tramrail Way



Wherever materials of any kind in a foundry are lifted, moved or handled, there usually are possibilities for effecting important economies. Probably in no other way can so much be saved and as many advantages obtained for such a small investment as through installation of proper materials handling equipment.

Mold-making is one of the many jobs that can be greatly eased and speeded with overhead Cleveland Tramrail equipment. Pouring, sand-handling, cupola-charging, cleaning are others. Often the same equipment can be used for several different purposes.

Cleveland Tramrail pays dividends — BIG DIVIDENDS. Most installations pay for themselves out of savings within one year; some in less than six months.

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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Foundry Developments

By EDWIN BREMER
Metallurgical Editor

INVESTIGATION of the possibility of employing wrought Cr-Ni-P, Cr-Mn, and Cr-Ni-Mn-V types of age-hardenable high strength steels in the form of castings is described in "Cast Age-Hardenable Austenitic Steels" by Lange, Howells, and Bukowski. A Cr-Ni-P austenitic steel with 0.3 C and 0.25 P developed yield strengths at the 100,000 psi level. The Cr-Mn type of austenitic steels containing P and V were age-hardenable, but castings of those alloys were brittle when heat treated to high strength levels.

Modifying the wrought Cr-Ni-Mn-V composition resulted in an alloy with good ductility and yield strengths at the 100,000 psi level. A fourth type of age-hardenable, austenitic steel, Mn-V, containing a minimum of alloying elements was developed. Full details are available in the report which is designated PB 131733, and may be obtained from the Office of Technical Services, U. S. Department of Commerce, Washington 25, for 50 cents.

Strain Gages

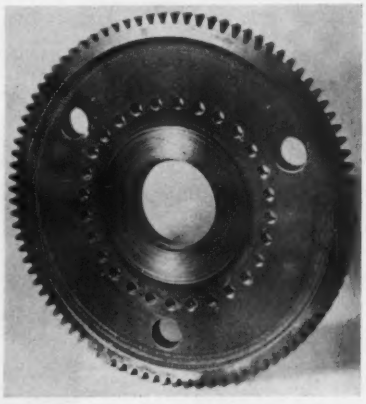
PROGRAM aimed at improving existing strain gages and developing new types for high-temperature use is being carried on in three laboratories at the National Bureau of Standards, Washington, under the sponsorship of the Navy, Air Force, and Atomic Energy Commission. Work includes improvement of ceramic-bonded gages, development of strain-sensitive evaporated film gages, and the evaluation and calibration of presently used and proposed strain-measuring devices.

Translation Aid

RUSSIAN-ENGLISH glossary of approximately 30,000 aeronautical and miscellaneous terms prepared by the U. S. Air Force has been published by the Office of Technical Services, U. S. Department of Commerce, Washington 25. Compiled to provide a reference document for translators, technicians and scientists engaged in translation and evaluation of aeronautical and other technical subject matter, the volume places emphasis on compound terms which frequently present difficulty in rendering idiomatically accurate interpretations. Volume containing 704 pages is designated PB 131634, entitled *Russian-English Glossary of Aeronautical and Miscellaneous Terms*, and is available from OTS for $7.

Casting Reduces Cost

BULL GEAR shown in the accompanying illustration formerly was made as a steel forging, but now is produced as a pearlitic malleable casting with an appreciable reduction in final cost. A modest weight reduction was effected through elimination of excess finish



stock and some additional savings were made on lower cost per pound. However, the real saving is credited to malleable iron's exceptional machinability. Direct machining time was reduced and costly deburring operations were eliminated. Total saving was $4.17 per gear divided as follows—reduced material cost $0.35, elimination of deburring and machining economies $3.82.

Safety Guide

HANDBOOK composed to serve as a guide toward safe design, manufacture, installation, use, maintenance, and disposal of beta-ray sealed sources for industrial applications has been prepared under sponsorship of the National Bureau of Standards. Entitled "Safe Design and Use of Industrial Beta-Ray Sources," the handbook is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, for 20 cents. Chapters are included on radiation exposure, selection of radioactive materials, instruction manuals, working conditions, accidents, and handling of sources. Also included are appendixes listing pertinent laws and regulations.

Boron Analysis

SIMPLE, reliable method for determination of small amounts of boron in steel with an accuracy of 5 to 10 per cent at the 50 parts per million boron level has been developed. Technique involves solution of the sample, adjustment of acidity, and passing the solution through an ion-exchange column of amberlite IR-120 (H) resin. Boron solution passed through the column is collected, its color developed with carminic acid, and the color intensity measured at 585 millimicrons in a spectrophotometer. Details are given in report PB 131374, "Research on a Method for Determining Boron in Low-Boron Steels," which is available from the Office of Technical Services, Department of Commerce, Washington 25, for 50 cents.

Property Information

ACCURATE data on various mechanical and physical properties of sound test bars from good quality melts are available in "Mechanical and Physical Properties of Three Low-Shrinkage, Copper-Base Casting Alloys," a paper by J. G. Kura and R. M. Lang, Battelle Memorial Institute, Columbus, Ohio, which was presented at the recent annual meeting of ASTM. Alloys included the 80-10-10, 85-5-5-5, and 88-6½-1½-4 or Navy M. Tests were conducted at minus 40 and plus 75, 250, and at either 450 or 550° F. Properties included tensile, yield, compressive, impact, and fatigue strength; hardness; machinability; melting range; patternmakers shrinkage; density, etc.

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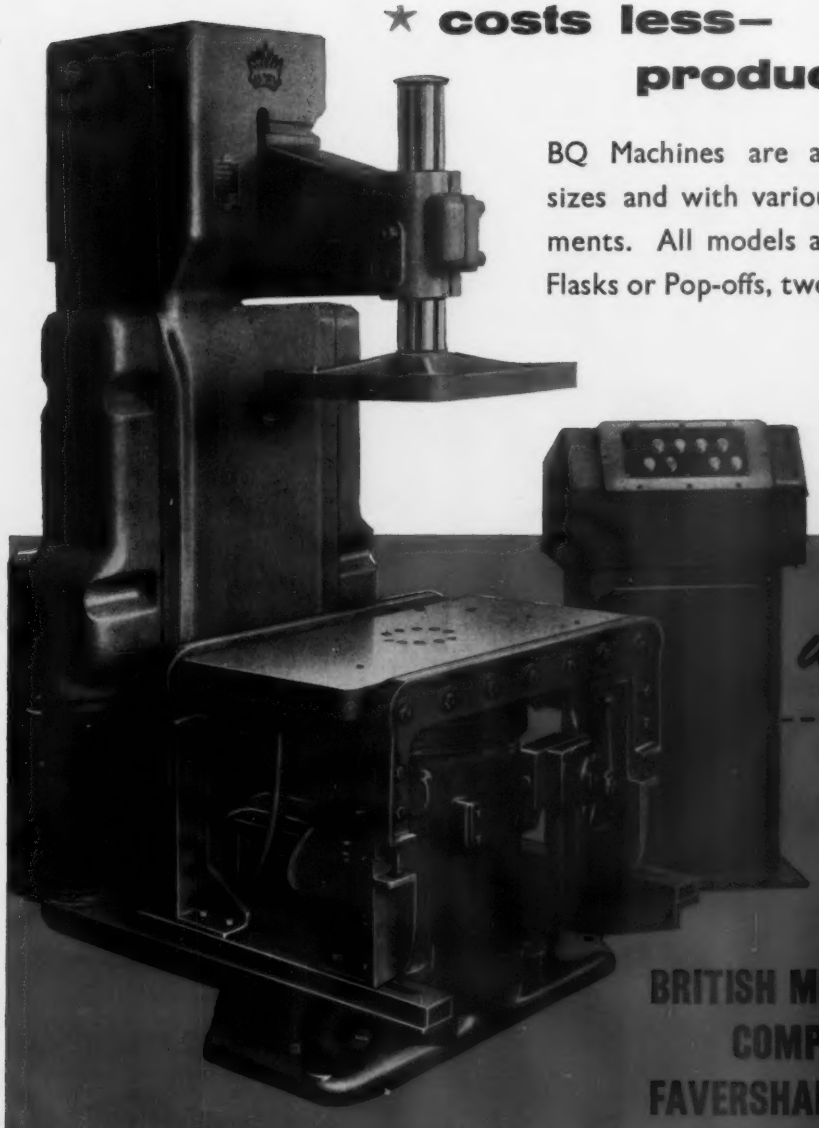

BQ Machines are available in different sizes and with various stripping arrangements. All models are suitable for Tight Flasks or Pop-offs, two at a time or singly.

Technical representation service and all spares Now available in USA & CANADA.

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FAVERSHAM KENT ENGLAND

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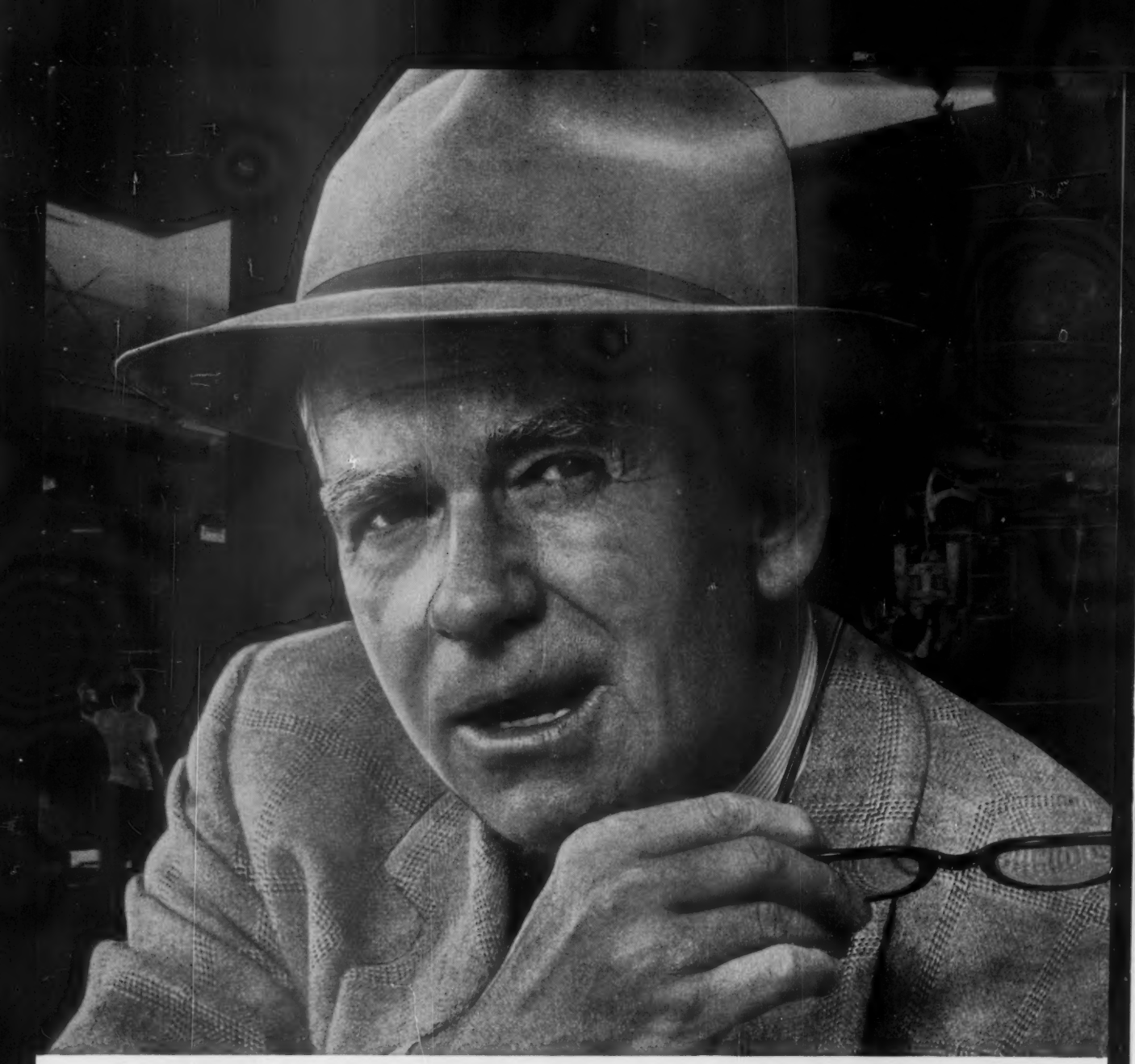


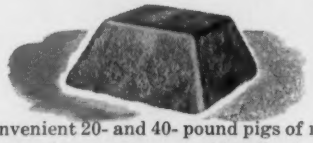
"We use only one chrome—refined charge chrome"

Iron and steel foundry operators are cutting chromium costs by using ELECTROMET's new low-cost refined charge chrome for all high-carbon chromium additions. Inventory, handling, and storage are greatly simplified by stocking only this one high-carbon chromium alloy. It is ideal for use as:

- **A charge material for basic-melted stainless steel.**
- **Final additions for alloy steel castings.**
- **Cupola or ladle additions for cast iron.**

Refined charge chrome combines the economy of regular charge chrome with the maximum cleanliness and low residual element content of conventional high-carbon ferrochrome. For facts on how refined charge chrome can reduce your costs, contact your ELECTROMET representative.

ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.



Convenient 20- and 40- pound pigs of refined charge chrome are magnetic, allowing easy handling with an electromagnet. Crushed sizes are available for ladle additions.

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FERRO-ALLOYS AND METALS

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Circle 630 on Page 131

Electric Motor Redesign

Converts To Castings

FALLING and splashing corrosive liquids—salt, dust, and acid-laden atmospheres—constant exposure to moist air—These are a few of the many environmental factors an electric motor design engineer must consider when he specifies the materials for his motor's frame.

And they are uppermost in the list of reasons why Reliance Electric & Engineering Co., Cleveland, turned to gray iron exclusively when it recently redesigned its complete line of integral horsepower ac electric motors to meet the new NEMA (National Electrical Manufacturers' Association) industrial standards.

Basically, the new NEMA specifications call for packing more horsepower into smaller frames. This created a design problem—that of providing sufficient cooling while cutting down on exposed surface area. Integrally cast design features proved the common-sense answer.

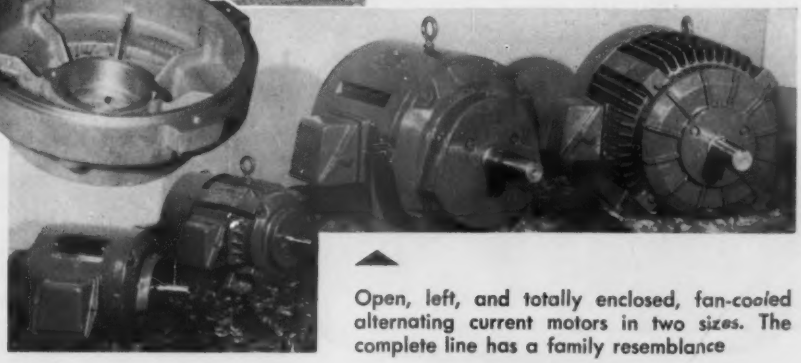
Reliance, a manufacturer of ac and dc electric motors for industry since 1905, has had long experience in using both rolled steel weldments and castings for its motor frames. Since there is no electric or magnetic flow through the frame of an ac motor, the frame serves primarily as protection for the motor's internal components and as structural support for the bearing brackets, feet, and other components. The corrosive atmospheres to which today's industrial motors are constantly subjected and the intricacies of design led immediately to the use of castings for the frames of the smaller units of new NEMA design.

When the larger frame specifications were released by NEMA, the motor manufacturer faced the problem all over again—whether to continue with rolled steel weldments in protected enclosures and castings in others, or to standardize on castings for the entire line.

It was a combined decision, with both engineering and purchasing taking an important part, according to F. R. Terrant, assistant manager of engineering of Reliance's Ivanhoe Division, which produces the large-frame motors. "There were certainly many inherent advantages to using castings in the design of the units, and purchasing showed how we could realize economies by standardizing on materials wherever possible. And from a sales standpoint, there's a 'family resemblance' maintained up and down the entire redesigned line. If a customer

Foundry representative, left, meets with F. R. Terrant, center, assistant manager, and Robert Culp, right, castings buyer, Ivanhoe Div., Reliance Electric, to discuss cast part design in relation to foundry production

Assembling a totally-enclosed motor which has cast gray iron end brackets and frame. Rotor is made by diecasting aluminum around a laminated rotor core



Open, left, and totally enclosed, fan-cooled alternating current motors in two sizes. The complete line has a family resemblance

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WRITE DEPARTMENT 9-A.

has found one size motor satisfactory, he'll be inclined to buy the same general features again in a different size unit."

Cooling a Problem — A major problem in the redesign of the Reliance ac motors, Mr. Terrant points out, was how to provide for sufficient cooling in enclosed frames. In fan-cooled motors and in fan motors which are used in the airstream of ventilating fans, cooling is effected by the passage of air over the outer motor surface to disperse heat. Naturally, such cooling is nearly proportional to the exposed surface area. In the new NEMA specifications, however, the frame for each horsepower size is smaller than that previously used. To increase the exposed surface area of the frame without increasing overall dimensions, a number of efficient cooling fins were added to the design. An integral part of the frame casting, the fins facilitate the free flow of heat from the inside of the motor to the outside surfaces over which the cooling air passes.

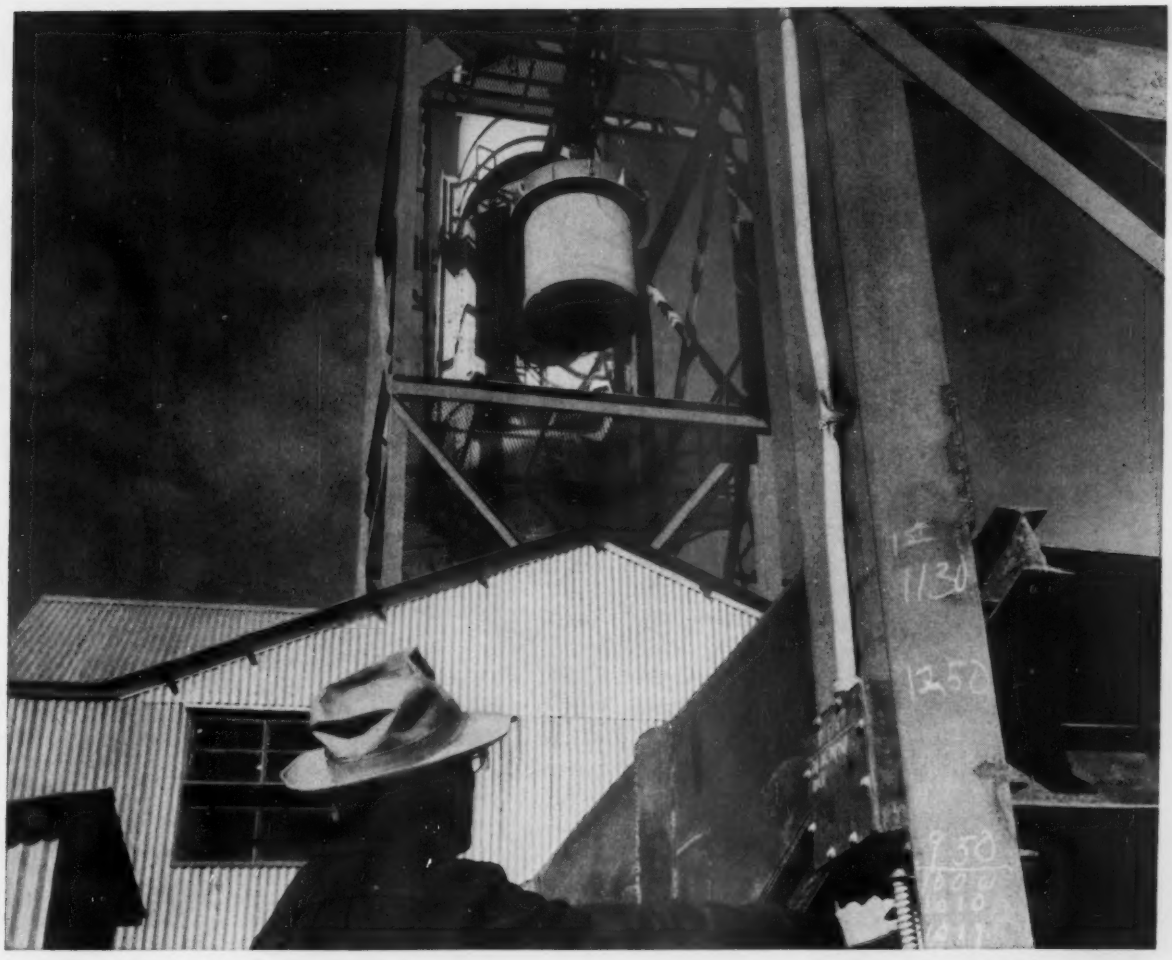
In many plants where corrosive agents exist, Terrant points out, the totally-enclosed and TEFC (totally-enclosed, fan-cooled) motor enclosures are used. These enclosures completely isolate the motor windings and internal components from all types of excessively corrosive conditions.

In some instances, where the danger is mostly from falling or splashing corrosive liquids, protected (open) enclosures can be used most satisfactorily. The motors, equipped with special insulation, are impervious to acids, water and oils, as well as most vapors and fumes.

In all cases, gray iron affords the corrosion resistance and added protection needed to insure long-life motor performance, but it is even more valuable in the protected frame. In this enclosure, ventilating air openings at the sides of the units can be easily cast in such a way that liquids coming at the motor in any direction from directly overhead to an angle of 10 degrees below the horizontal cannot enter the motor.

"And the freedom of design and styling with a casting is great," Terrant adds. "Smooth surfaces and contours which castings permit lend not only to good appearance, but avoid pockets and crevices in which corrosive liquids might accumulate."

Damping and Machinability — Other advantages of heavy cast iron frame include the damping effect on



Four-man foundry does BIG job

The Rhude Media Co. of Marble, Minn., makes a fine iron powder for mines practicing beneficiation (reclaiming low-grade iron ore). Until recently, Rhude bought the needed iron in ingots. Now a new foundry enables the company to melt its own iron from scrap, using a Whiting #7 Cupola, U-Ladle, and Trambeam Charging System with two buckets.

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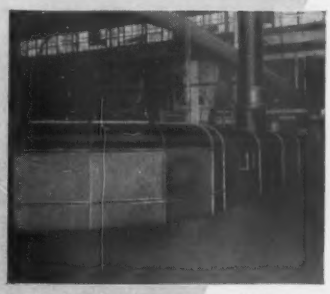

COOLING—Large volume of air passing through cooling tunnel removes fumes, cools molds.

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GRINDING-SNAGGING — Battery of double grinders exhausted by Kirk & Blum system; dry collection.

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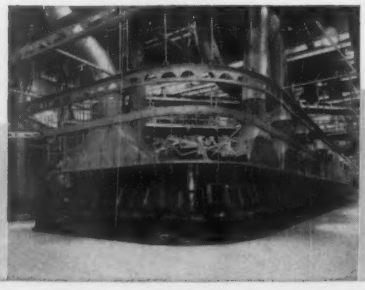

POURING—Hood collect fumes over entire length of moving floor, "Pouring" station.

vibration and noise for quieter, smoother operation of the motor and of the machine on which it is mounted as the driving unit.

"Add machinability to the list," advises R. J. Culp, castings buyer at the Ivanhoe Division. "That's one of the prime reasons we specify gray iron in about three-fourths of all our castings purchases, which total several millions of pounds annually. We use mostly green sand castings, for end brackets and for frames—about 60 per cent, in fact. The rest are dry sand castings; they're used mostly for specially designed units."

Purchasing Agent W. J. Hall of the Ivanhoe Division points out that to get the best performance from each supplying foundry, representatives are called in for consultation and suggestions when a new motor design is being taken through the final steps of development.

"As the engineers specify the class metal to be used, the foundry representative immediately checks the practicality of casting it," Hall relates. "This co-operation and frankness save us both the expense and delay of changing specifications and design details later on."

The average motor has a wall thickness of between 5/16 and 3/8 in. Most of the gray iron used at the Ivanhoe Divisior is Class I (tensile strength of 25,000 psi.; Brinell hardness range, 140-200). Explosion-proof motors, which Reliance produces in large quantities for industry, are all of Class IV (40,000 psi. tensile strength; Brinell hardness range of 205-265).

Book Review

Fluid Dynamics and Heat Transfer, **by James C. Knudsen and Donald L. Katz, 576 pages, published by McGraw-Hill Book Co., New York. Price $12.50.**

Basic aspects of fluid mechanics are presented in such a way that they may be understood and applied to problems in fluid flow and to problems in heat transfer. The authors carry the development from the application of first principles in fluid mechanics and heat transfer through practical formulations used in design procedures. Quantitative and theoretical data are presented.

Also covered are recent advances in liquid metal heat transfer, recent studies of flow in entrances, and much of the recent material on the analogy between fluid flow and heat transfer.

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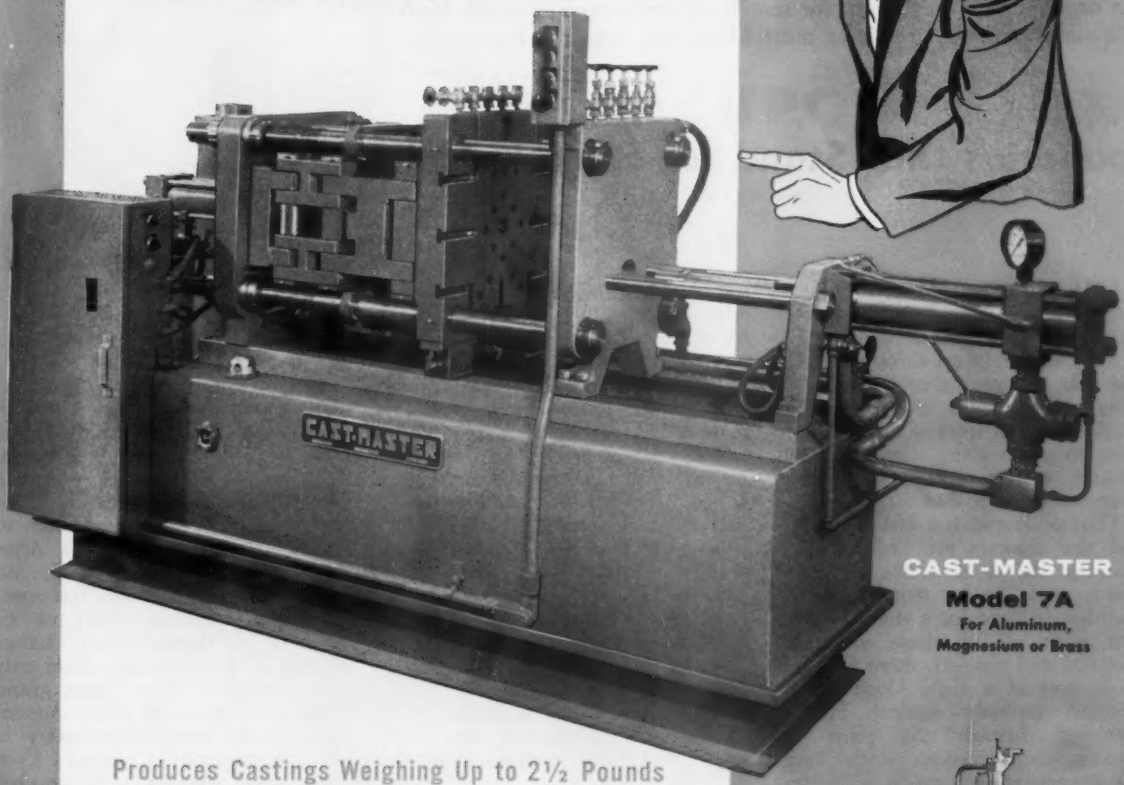

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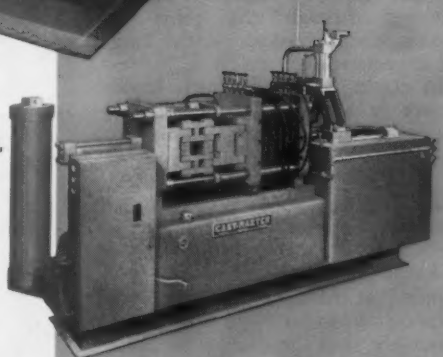

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Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"An organization that stands for something and operates on the basis of clearly defined principles most likely will weather the storms"

Foundries that Stand for Something

I HAVE often wondered just what enables some foundries that start on a shoestring in difficult times to march steadily on through thick and thin and year after year, while others with a silver spoon in their mouths, and in spite of loving care, seem to catch every disease going around, wither on the vine, and poop out while still in diapers.

This, of course, is a $64 question, and the answers are likely to be found in any or all of the elements which seem to be required in a foundry destined for a ripe old age. But with all of these elements weighed and charted, there appears to be sort of a virile blood factor or an antibody against failure coursing through the veins of foundry organizations with long life expectancies.

In casting about for such blood factors or antibodies I thought of the press and broadcast comments on the recent top echelon changes in General Motors. Having been associated with GM since 1916, I was particularly interested in a *Detroit Free Press* editorial headed "Changing the Guard Without a Ripple." It commented on how the corporation seems to roll on progressively and profitably in spite of conditions and changes in top management. But I'm afraid the editorial oversimplified the reason when it said, "It simply means that the corporation is so rich with high-level administrative talent that when promotion is due, signs can point in any number of directions."

Demand Exceeds Supply—I nodded my head at this, being well acquainted with efforts over the years of selecting and training promising leadership and administrative talent along with a lot of other talents. But I happen to know for a fact that the demand always exceeds the supply, also that the virility and longevity of GM can't all be laid to an abundance of management talent.

As an oldtimer (even though retired in a vague sort of way), it seems to me that there's another and most important angle to the momentum GM has attained which seems to carry it over the humps of one kind and another, and that is *a clearly defined policy*—sort of a business religion or rather a creed.

Many years ago, GM decided that, with so much at stake, with so many emergencies to meet, and with so many people involved, there had to be a common understanding of the kind of an outfit it was trying to be. In other words, there had to be a set of principles that everyone would not only know and believe in, but would stick to regardless of what came up. After these principles were lined up, no one individual—not even the president—could change them or go contrary to them. When change seemed to be in order, it could only be made after one or more grand pow-wows involving those responsible for all activities necessary to the operation of the business. Even then these changes were checked and double checked.

Any organization to be successful needs clearly defined principles

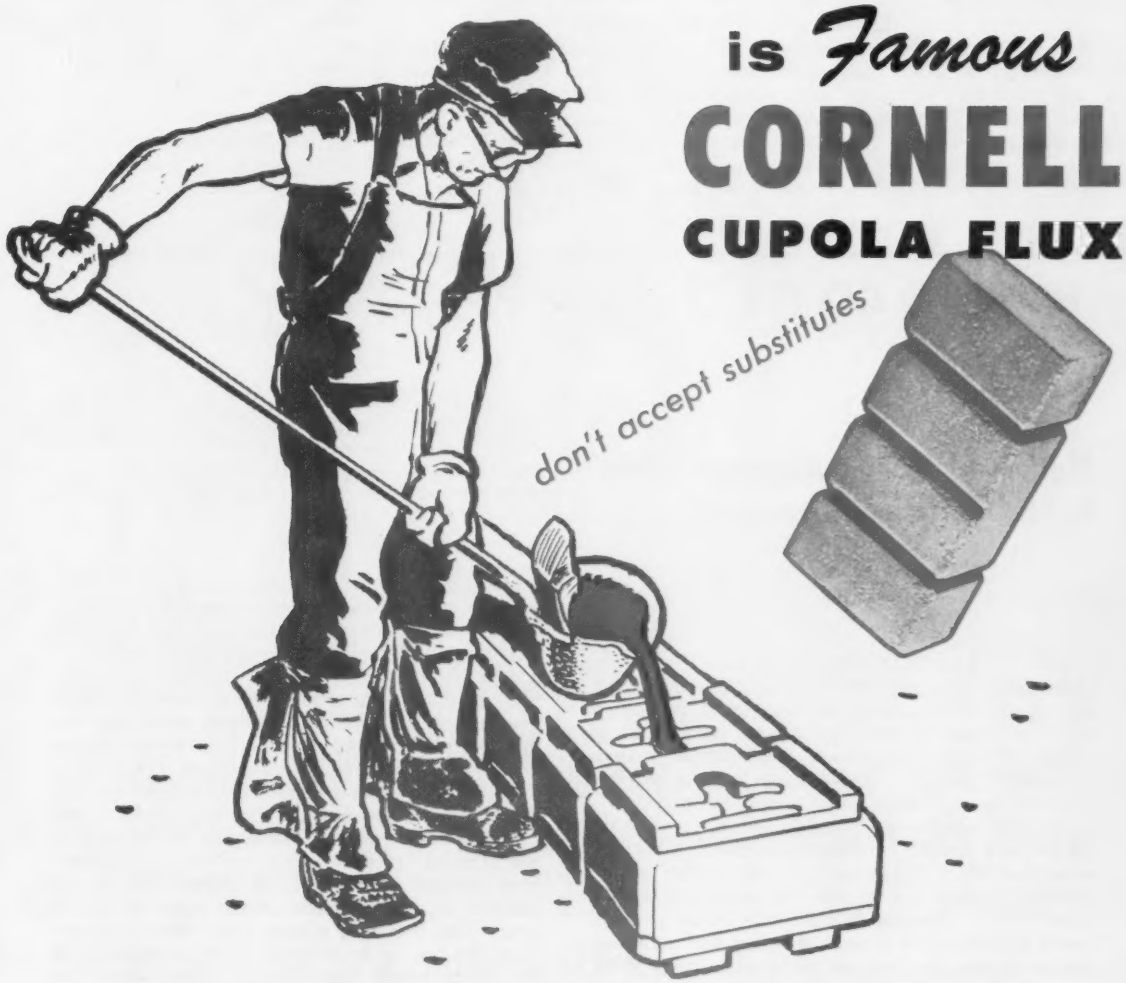
Getting the Answers—With this sort of a business constitution to tie to there were many important questions which could be answered and decisions made by a lot of people, whereas in an organization without such a constitution these same questions would have to go to the very top for answers. And many of the answers might seem to be given on the basis of personal opinion, mood, or combination of circumstances. While even with the best of constitutions most questions had to be answered on the basis of individual experience and judgment, there was a solid backbone of principle as a general guide to help the individual stand on his own two feet. I wouldn't be a bit surprised if we found that some such creed, policy, or constitution was the common denominator of those foundry organization which you

Cleaner iron depends on a number of things. One of the most important

is *Famous*

CORNELL

CUPOLA FLUX



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couldn't manage to kill with a club.

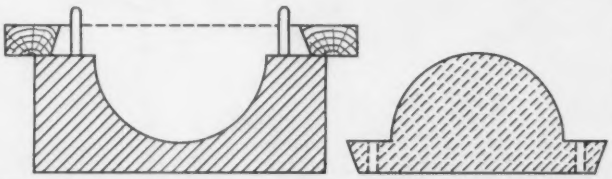
Well, anyhow, as president of the Lee Hobby Foundry, and now that back orders are not too heavy a load for me to carry, maybe I'd better buckle down and get our constitution in order—get down in black and white such things as: Why we are in business (besides making money, if any, that is). What we stand for. What we will do. What we will not do. What our specialty is. Our code for dealing with our customers. Our code for dealing with our suppliers. Our code for buying new things. Our code for borrowing money. Our code for paying our bills. Our costing and pricing code. Our quality code and last but far from least our code for dealing with each other *man to man*. Oh, of course there's a lot more.

Where It Applies—I may be going overboard for a little peewee organization with only one employee including the president, but for organizations of 2 to 500,000 I don't think so; in fact, I'm very sure of it. There seems to be no question that organizations trying to operate on a dictator basis, no matter how benevolent, are hamstrung to begin with and will never measure up to their opportunities.

But an organization that stands for something and operates on the basis of clearly defined principles most likely will weather the storms. Even if the principles leave much to be desired, they're a darned sight better than none.

P.S.—There are lots of families falling apart for want of a code—and individuals too.

HOW TO DO IT



SECTIONED VIEW OF CORE BOX WITH WOOD FRAME IN POSITION

SECTIONED VIEW OF PLASTER CAST FOR BEDDING OPERATIONS

Method of Making Aluminum Driers Is Said To Offer Advantages

By **ORMIE R. SCOTT**
Nine Woodycrest Dr.
Guelph, Ont.

FITTING or BEDDING-IN of new aluminum core driers is costly and time-consuming. The operation usually involves making a two-piece wooden pattern of the desired core, incorporating proper shrinkage allowance. The pattern is used to make a plaster master corebox from which the production aluminum corebox will be made.

Another plaster cast is made over the drier half of the core pattern, carved to a 3/16-in. wall thickness and then duplicated in low shrink white metal. This is the pattern for producing aluminum driers. Invariably this white metal pattern must go through a process of fitting and scraping before it can be used to make cast driers with proper contours to support the cores.

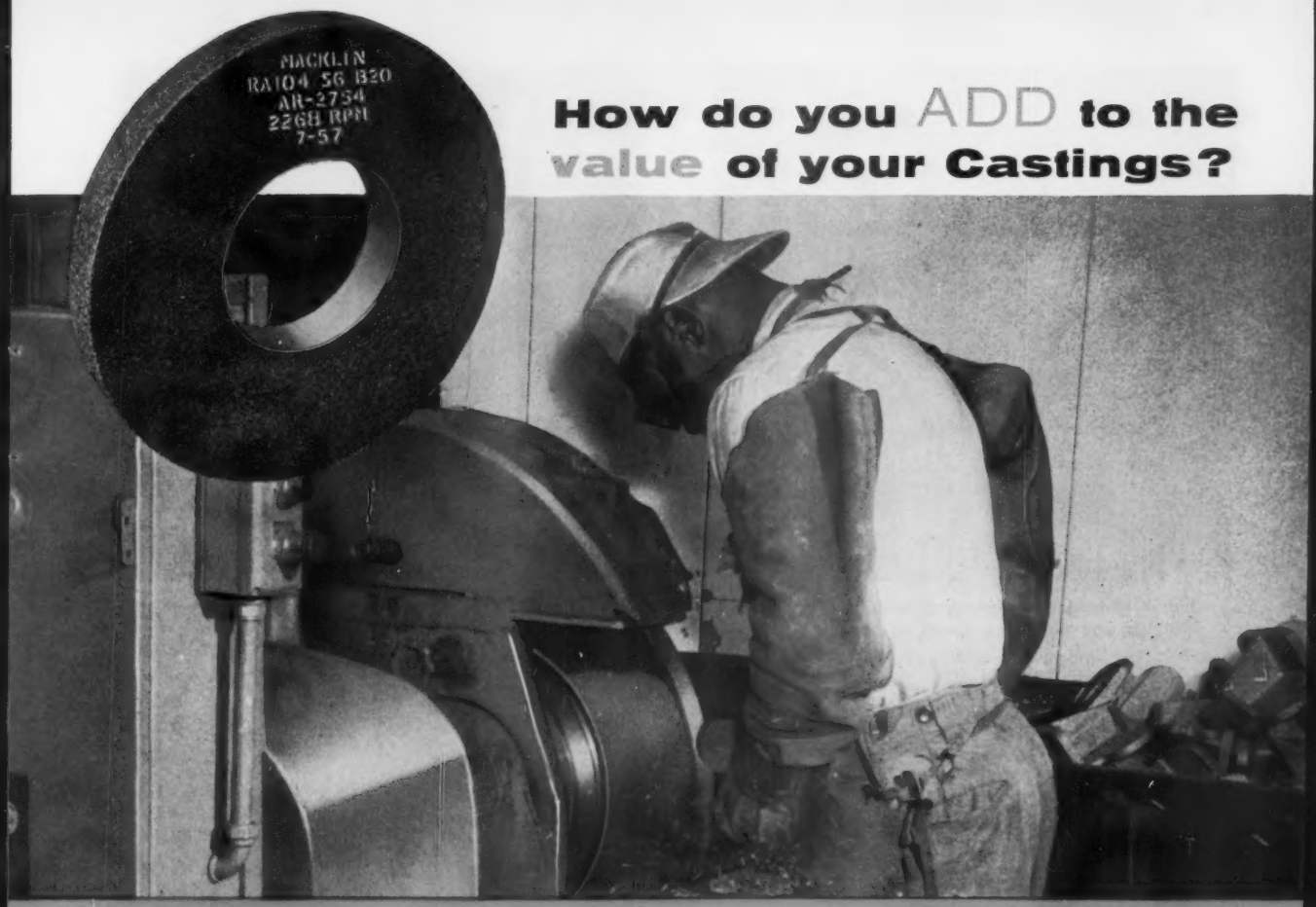
Bedding-in equipment for the fitting process is made by pouring plaster into the assembled aluminum corebox, removing the drier half of the box and coating the protruding half of the plaster core with a mixture of red lead, oil, and shellac. The white metal pattern is laid on the coated plaster form and rapped gently. High spots on the pattern pick up some of the red coloring and must be scraped down by hand. Then a few aluminum driers are cast and fitted in the same way. They must be scraped if not of proper contour. Fitting and scraping of pattern and sample driers continues until the proper contour has been obtained. This process is necessary because the white metal pattern is oversize to allow for shrink of the aluminum driers, and the plaster bedding core already contains the shrink from the aluminum corebox.

Customers often require sample driers and cores before placing the equipment into production. This necessitates removal of the plaster bedding-in form from the corebox so that cores can be made. Removing and replacing the plaster sometimes is a difficult job.

In an attempt to avoid these difficulties of drier production, the following method, using high expansion plaster, was adopted. A wooden frame about 1 in. thick is built to follow the contour of the corebox cavity and also encompass the dowel pins. The opening is about ½-in. larger than the core cavity. The frame is clamped on the drier half of the corebox and temporary dowel pins inserted in the box. A plaster with an expansion of about 5/32-in. per ft is poured in the box. The resulting plaster core, when removed from the box, is an accurate form on which to fit the white metal drier pattern. The true-to-size accuracy obtained by using the expansion plaster eliminates the necessity for making, fitting, and scraping sample aluminum driers.

However, some customers require fitting and scraping of driers for extreme accuracy. Equipment for this is made by positioning the wooden frame as before and placing mating metal bushings on the dowel pins. This time the box is poured with a high strength, low expansion plaster, producing a good form for fitting the aluminum driers. The bushings make good jig holes for drilling the driers. Meanwhile the corebox is available for sample cores whenever needed.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea



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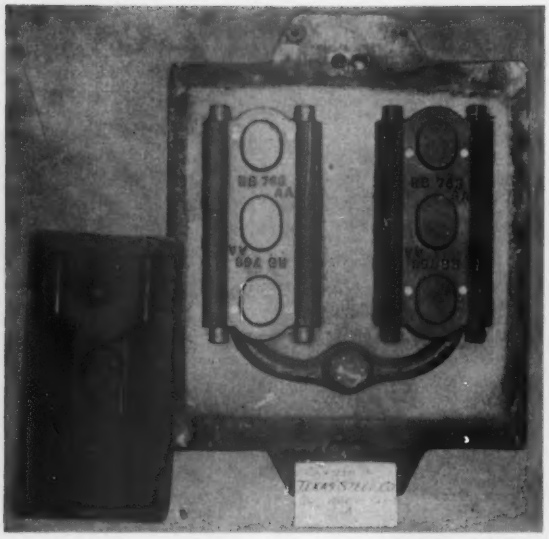


Fig. 1—Pinned box pattern of laminated fiber glass. Solid plastic part was found to be less expensive

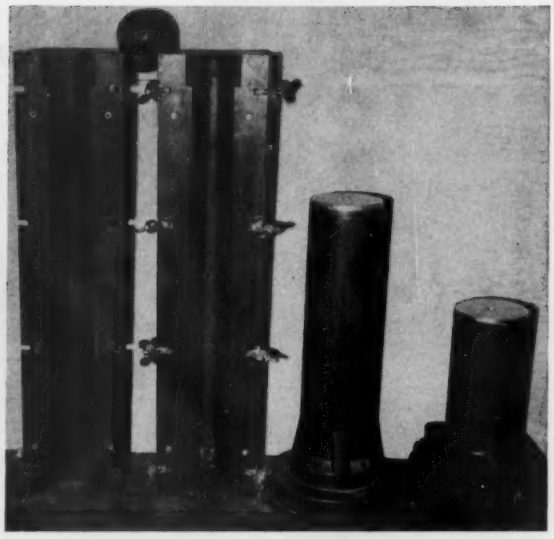


Fig. 2—Finished three-piece corebox and two-piece pattern for ingot mold made at considerable saving

One Foundry's Experience with

PLASTIC PATTERNS

By RICHARD E. GRIMES
Supervisor, Estimating and Processing
Texas Steel Co., Fort Worth, Tex.

SOME time ago, Texas Steel Co. had a dual problem involving pattern and corebox equipment. For one thing, the foundry has about 15,000 patterns in storage, most of them made of wood. These wooden patterns require continuous, time-consuming, costly repairs, and, in addition, replacement patterns must be made frequently.

Secondly, the company decided to change from the production of half cores, which required pasting, to that of full cores. Most of our coreboxes were half boxes, and we needed a means of converting them to full boxes quickly and economically.

It was at this time, as a result of both of these problems, that we decided to investigate the features of plastic pattern and corebox equipment. A completely objective approach was outlined. We selected various shapes and sizes of wornout coreboxes and patterns with which to start our evaluations.

Results Good—One of the first items selected for evaluation was a pinned box pattern, shown in Fig. 1. We reproduced this pattern in plastic and ran it in production every day for many weeks. At the end of the production run, the plastic patterns showed a better, slicker surface than the aluminum equipment used previously.

After our initial success, we carried out various experiments to devise the least expensive means of producing plastic equipment. We soon learned that a solid pattern could be cast in plastic cheaper than a fiberglass lamination could be made, and we have had considerable success casting solid forms. We still, however, employ fiberglass for intricate shapes and where greater strength and weight reduction are desired. We also used many varieties of compatible aggregates to increase adaptability and reduce plastic cost.

Results of our first evaluations of the process were impressive. On one job, for example, which we had changed from a half core which required pasting to a full core, a 16 per cent scrap rate was causing a severe loss. When we made a full plastic box and blew the core, we completely eliminated the scrap. This conversion also solved another problem. Previously, the cored surface of the casting did not allow for a bolt to pass through the casting because of fins produced by the pasted core. The plastic full box ended this condition and also speeded up production.

Gaining Experience—We found that a definite learning period was required. We learned enough, for example, to cut manhours and to avoid the air pockets and voids which had a tendency to appear on the first patterns we fabricated. As with any new material, we had to revise our thinking and techniques to obtain the results desired. One thing that became evident quickly was that we could produce this type of equipment with workers of lower classification, thereby reducing labor costs.

In time, our evaluations progressed to more intricate shapes and much larger patterns. After each

Fig. 3—Finished full split corebox and the dummy masters for forming it

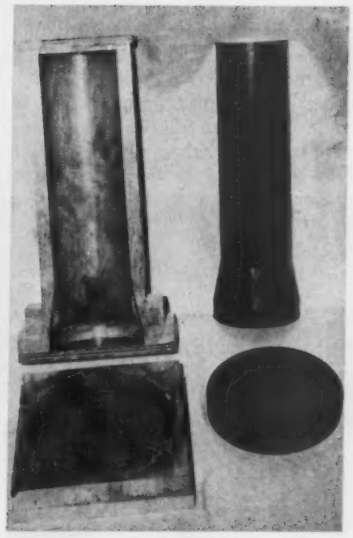


Fig. 4—Half of pattern, core print, and molds in which they were formed

and COREBOXES

pattern had been completed and put into production, a study was made of its use in the foundry, and the results were tabulated. With experience, we learned better and cheaper ways.

We devised methods of repairing our old patterns or boxes by taking impressions of them and reproducing them in plastics. We observed that our plastic coreboxes released better than the previous ones, particularly with CO_2 green sand. The release of patterns from molding sand was equally good. These excellent releasing qualities resulted in less patching and pointing up.

We further found that plastic patterns readily absorb shock and other abuse without impairment of their drawing qualities. Furthermore, if a corebox is worn or chipped by ramming, for example, the box can be brought back to the pattern shop, the master pattern inserted, and plastic poured in the chipped or worn areas. Plastics also can be used to alter existing aluminum pattern equipment.

The history of a 30-in. valve pattern illustrates the value of plastics in pattern repair. This pattern, which originally cost about $6000, no longer would produce a salable casting. Our customer permitted us to reface it with epoxy resin and fiberglass. Cost of this repair was $1500. The customer thus saved $4500, and the pattern is better now than it was when new.

As might be imagined, it often is more costly to construct a new pattern or corebox from plastic than it is to effect repairs. We have determined, however, that in many instances it ultimately is cheaper to construct a new plastic pattern because of its longer life and the elimination of subsequent repairs to the older pattern.

Ingot Mold Equipment—One of our latest jobs was the fabrication of an ingot mold pattern and corebox, shown in Fig. 2. We are attempting to determine whether a pattern of this type will give equal or superior results at a cost reduction of more than 30 per cent.

In the construction of this corebox, a dummy master (see Fig. 3) was fastened to a straight, level surface board to provide a flat joint or face on the corebox. A parting agent was applied to assure release of the plastic from the dummy, and two layers of surface coat were brushed over the entire surface of the dummy. These were followed by a surface layer of plastic about 1/16 in. thick. Two layers of fiberglass cloth were laid up with a laminating epoxy while the surface coat was sticky. Pressing glass cloth into the second layer of surface coat assures a good bond between surface coat and backup layers of glass cloth. This bond averts chipping and separation of the surface coat along edges and corners of the box after it is put in production.

After the two layers of cloth had been applied, an aluminum skeleton or framework was set in while the last layer of cloth and plastic still were tacky. We continued to lay up cloth with laminating plas-

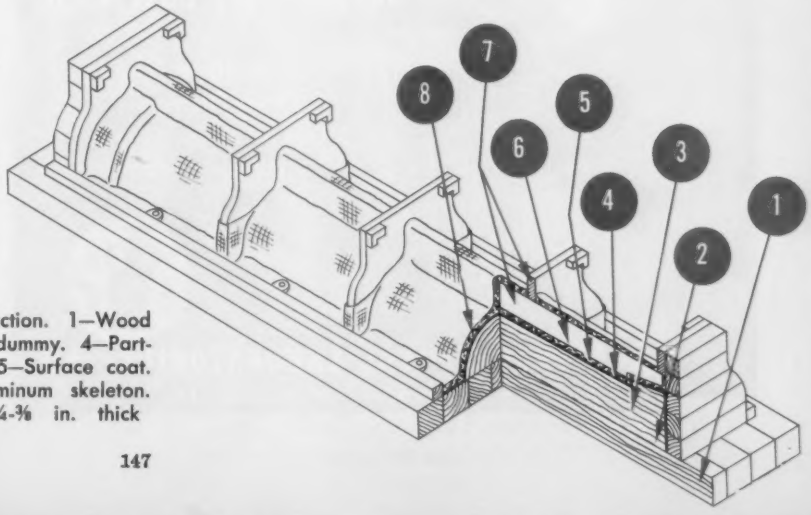


Fig. 5—Cross section of corebox construction. 1—Wood surface plate. 2—Parting line. 3—Wood dummy. 4—Parting agent (applied directly to wood). 5—Surface coat. 6—Two layers of glass cloth. 7—Aluminum skeleton. 8—Additional layers of glass cloth ¼-⅜ in. thick

tic until the thickness of the shell was 1/4 to 3/8 in. Cloth can be applied in pieces of any shape or size, but for maximum strength the pieces must overlap and joints must be staggered. Care should be taken to apply each layer while the previous one is tacky. This precaution is not always possible or absolutely necessary after the first few layers, but a cured layer should be cleaned and roughed up to insure a good bond to the next one.

When half of the corebox was finished, it was permitted to cure for 24 to 36 hours before removal of the surface board. After the surface board had been removed, the dummy was left in place and the other half of the dummy doweled to it. This step insures a perfect match of the halves of the corebox. Dowel pins in the box were cast in place to eliminate the possibility of a shift. The eight clamps to hold the box together also were cast into the box and reinforced by glass cloth laid over them and tied into the body of the box.

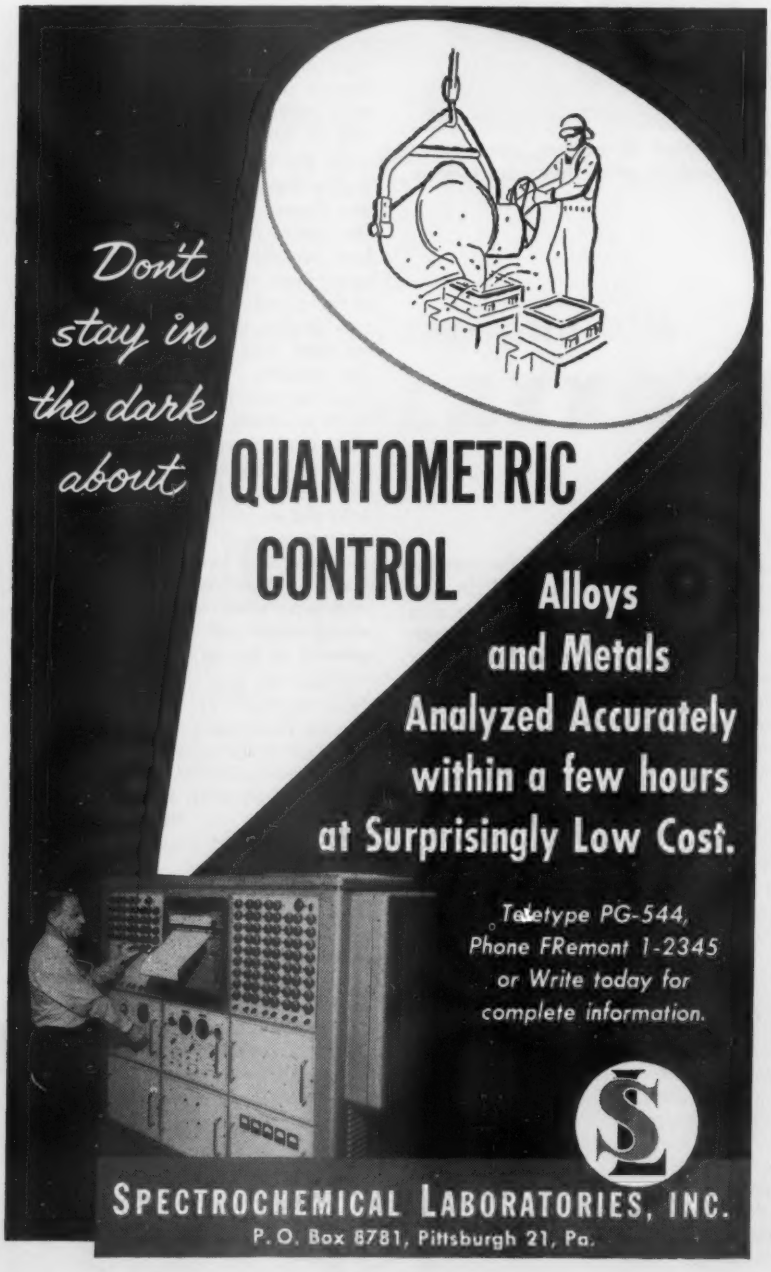
The round disc in Fig. 4 is a coreprint that fastens to the bottom of the ingot mold pattern. It was formed in the wooden mold with two layers of surface coat and two layers of glass cloth which amounted to about 1/8 in. thickness. The cavity then was filled with crushed walnut shells mixed with plastic.

The ingot mold pattern, also Fig. 4, is a cylinder about 8 in. in diam and 33 in. long. Because we could find no practical method to build up a complete cylinder and reinforce it properly, we built the pattern up in halves in the wooden mold. This procedure enabled us to use aluminum ribs for reinforcing and simplified the laying up of glass cloth. We built up both halves in the same wooden mold. After they had cured properly, we faced the joint on a disc sander and bonded the halves together with the same plastic we had used for laminating. Next, we fastened the solid coreprint to one end and bolted a 1/2-in. aluminum plate to the top. Fig. 2 shows the completed three-piece corebox and two-piece pattern.

Fig. 5 illustrates the construction of the ingot corebox in cross section. This type of plastic construction is desirable for large boxes and patterns as a means of reducing weight and costs. For very intricate cross sections, the fiberglass reinforcement also is desirable from a standpoint of strength. Smaller patterns generally are cast of solid plastic with lightweight aggregate.

Benefits of Plastic Equipment— Use of plastics in our pattern shop has provided a standard material for use in repair and construction of pattern equipment. In addition, it has reduced our costs, simplified and sped up production, and improved casting quality. Any adequately equipped pattern shop can produce this type of equipment with no expenditure beyond that of the materials involved.

Texas Steel Co. developed its plastic pattern equipment practice with the co-operation of Rezolin Inc., Santa Monica, Calif., supplier of the epoxy resin plastics used by the company.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Foundry Equipment Builders Plan 40th Annual Meeting

Fortieth annual meeting of the Foundry Equipment Manufacturers Association will be held at the Greenbrier, White Sulphur Springs, W. Va., Oct. 16-18.

Meetings on the first day will

25 tons of Quality Steel per charge for GENERAL STEEL CASTINGS

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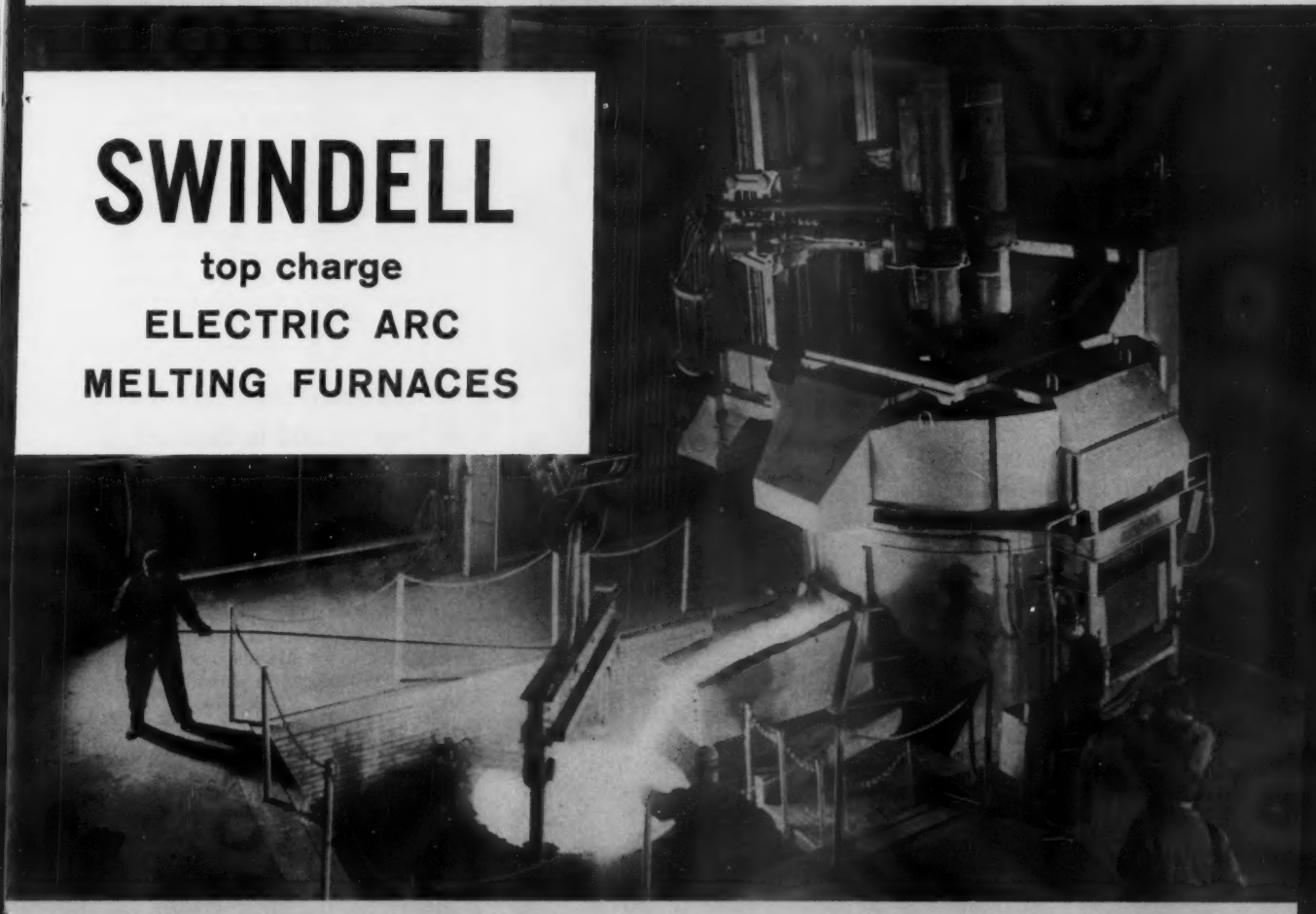
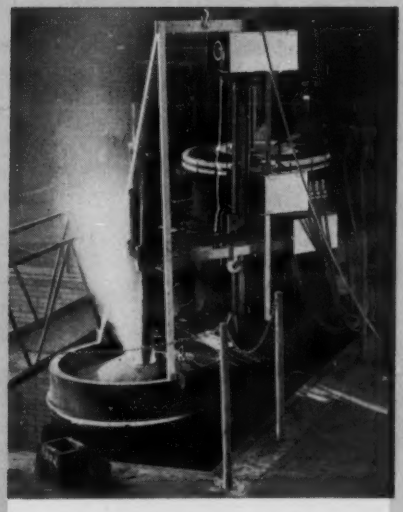




Swindell Electric Arc Hot Top
In General Steel's Avonmore Plant

The design of this new 25-ton Swindell Top Charge Electric Arc Melting Furnace was determined by the special requirements for steelmaking of large rolls at the Avonmore, Pennsylvania plant of General Steel Casting's Corporation's National Roll and Foundry Division. In addition to designing and building the furnace, electric arc hot top and charging equipment, Swindell engineers cooperated with General Steel's operating personnel in planning plant layout, materials flow and procedure. • Your inquiries are welcome. Let us consult on your melting requirements.

SWINDELL-DRESSLER

CORPORATION

Pittsburgh 30, Pennsylvania

DESIGNERS AND BUILDERS OF
MODERN INDUSTRIAL FURNACES

Circle 638 on Page 131

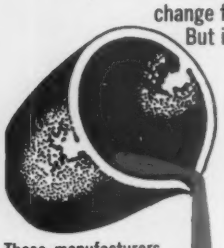
BOY! was my face RED!

I'd always used crucible furnaces in my shop, until a few years ago. Then, I switched.

But not for long!
I'm back to
crucible furnaces again.
Why? two counts:
Cost, and **flexibility.**

Know what I found? My crucible cost, per pound of metal melted is **no higher** today than it was in 1940! Sure, crucibles cost a little more today, but I get more heats. I checked my old records, and per pound of metal melted my **crucible costs are the same!** And another thing — **flexibility.** On a lot of these non-crucible furnaces, try and change from one metal to another without contamination! But in my crucible furnaces, I just change from one crucible to another, fast, simple, and trouble free!

From now on, its **crucible melting** for me!



These manufacturers are ready to assist you with melting and pouring problems, foundry layouts and crucible furnace servicing.

LAVA CRUCIBLE-REFRACTORIES COMPANY
ROSS-TACONY CRUCIBLE CO.
VESUVIUS CRUCIBLE COMPANY
AMERICAN REFRACTORIES & CRUCIBLE CORPORATION
JOSEPH DIXON CRUCIBLE CO.
ELECTRO REFRACTORIES & ABRASIVES COMPANY

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☐ Send "Crucible Charlie" Brochure #3 "Furnace Maintenance".
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POSITION.....COMPANY.....
ADDRESS.....
CITY.....STATE.....

center on topics of interest to the various product groups, including blast cleaning and tumbling, dust and fume control, flasks and accessories, furnaces and accessories, material handling and processing, and various types of molding and coremaking machines.

A panel discussion of the theme, marketing of foundry equipment, will have R. A. Brackett, Spencer Turbine Co., as moderator, with the following panel members: Gordon Seavoy, Whiting Corp.; Philip Bauer, Allis-Chalmers Mfg. Co.; George Pope, FOUNDRY, and David Davidson, Link-Belt Co.

A featured speaker will be Ross L. Gilmore, president, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., who will discuss "Meeting Today's Requirements for Quality Foundry Products."

National Metal Show Expected To Draw 50,000 to Cleveland

National Metal Exposition and Congress, to be held at Cleveland, Oct. 27-31, will have for its show theme "Make It Better with Metals—for Less." Nearly 500 exhibits are scheduled to occupy 300,000 square feet of floor space in Cleveland's Public Auditorium. American Society for Metals, sponsor of the event, expects an attendance of about 50,000.

The ASM and other co-operating groups will present more than 150 papers at technical sessions. These organizations include the American Institute of Mining, Metallurgical and Petroleum Engineers, the Society for Nondestructive Testing, the Industrial Heating Equipment Association, the Metal Powder Industries Federation, the Metal Treating Institute, and the Metals Division of the Special Libraries Association.

The Campbell Memorial Lecture, following the ASM annual meeting, will be given by Dr. Peter Payson, Crucible Steel Co. of America, Pittsburgh, on "Tempered Alloy Martensites."

Dr. Clarence O. Lorig, technical director, Battelle Memorial Institute, has been nominated president of ASM for the coming year. Following the annual election he will succeed G. MacDonald Young, technical director, Aluminum Co. of Canada Ltd., Montreal. Vice presidential nominee is Walter Crafts, associate director of research, Metals Research Laboratories, Electro Metallurgical Co., Niagara Falls, N. Y.

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WORLD'S LARGEST PRODUCER OF SECONDARY NICKEL ALLOYS OF CERTIFIED ANALYSIS

Circle 641 on Page 131

Union Casting Company, Middlesex, New Jersey, bought two Tabor Top-Squeezers in 1946. "Ten years of day-in-day-out production with pennies for maintenance" — that's the report of John von See, President.

With this Tabor jolt-squeeze machine, the first cost is the lowest on today's market. Table size is 16"x19". Squeeze cylinder is 10" diameter. Squeeze pressure relief valve, to assure uniform density on similar molds, is optional. The squeeze unit is fully enclosed and off the floor — protected from sand, dirt and dust.

Each machine in the Tabor line has mechanized muscles to give you more castings per hour, less downtime per machine. Write for Condensed Catalog or ask to see the Tabor Man—the technical man.

TABOR

THE TABOR MANUFACTURING CO.
Division of Turbo Machine Company
LANSDALE, PA.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 181

NONDESTRUCTIVE TESTER

Eddy current testing instrument is designed to locate and determine the relative seriousness of defects in all conductive materials. It also

sorts mixed lots of ferrous and nonferrous metals, determines differences in hardness, alloy, and heat treat condition, and measures the thickness of certain conductive and nonconductive coatings on conductive bases. It can be used on as-cast surfaces after normal cleaning. Special probes can be designed to reach surfaces not easily accessible or of unusual contour. The equipment operates on 110-v, 60-c, single-phase, alternating current.—**Magnaflux Corp.**, 7300 W. Lawrence Ave., Chicago 31, Ill.

For More Details Circle No. 450—Page 181

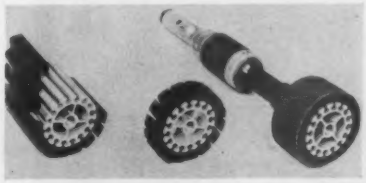
RADIANT OIL-GAS BURNER

Radiant, pulsation-type, oil-gas burner produces a luminous flame with a peak temperature of 3450° F when burning oil and above 3300° F with 1000 Btu per cu ft natural gas. Burners are available for heat release rates up to 70 million Btu per hr. The burner uses air at 3 psi to atomize fuel. The flame produced is a steady, extremely rapid series of explosions, resulting in efficient combustion without smoke, soot, or carbon buildup, it is claimed. It has been used successfully in air furnaces for melting or holding molten metal at pouring temperature.—**E. W. Bliss Co.**, Canton, Ohio.

For More Details Circle No. 451—Page 181

EXPANDING GRINDING WHEELS

Four - inch - diameter, expanding grinding wheels have been added to the company's line. The extruded aluminum wheel core, developed in conjunction with Aluminum Co. of America, facilitates custom sizing of individual wheels to specific use requirements. Wheels are said to be concentric and to retain the abrasive band under all operating conditions. No glue or other bonding material is used. Bands can be slipped on or off easily when wheel is at rest. Separate, replaceable



rubber flexers may be slid in and out of keyed retaining slots in the wheel core.—**Nu-Matic Grinders Inc.**, 8224 Carnegie Ave., Cleveland 3, Ohio.

For More Details Circle No. 452—Page 181

STEEL CORD TIRE

Pneumatic industrial tire with steel cord breaker construction has a puncture resisting barrier of two criss-crossed steel cord breaker strips locked in place beneath the tread by specially-compounded rubber. Sizes are 4.80/4.00-8, 6 ply in the super rib design, and 6.00-9, 10 ply; 6.50-10, 10 ply; 7.50-15, 10 ply; 7.00-12, 12 ply, and 7.50-10, 12 ply in the industrial lug design.—**Goodyear Tire & Rubber Co.**, Akron 16, Ohio.

For More Details Circle No. 453—Page 181

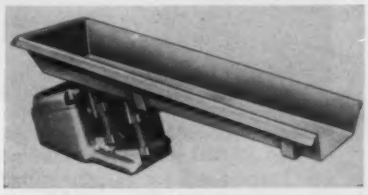
BLOW MIX REFRACTORY

Quartz-fire clay refractory is formulated for gun emplacement or hand ramming. Silica pebbles used in the mixture are Sharon conglomerate of 99.5 per cent purity with a pyrometric cone equivalent of 33-34. The highly refractory, plastic clay is from the southern Ohio district. It is said to be low in impurities and is ground fine to obtain a uniform, well-coated mixture. It is claimed that the coating reduces dust, minimizes rebound, and improves flowability. The refractory is shipped in bulk or multiwall kraft bags.—**Lawrence Refractories Clay Co.**, Pedro, Ohio.

For More Details Circle No. 454—Page 181

VARIABLE RATE FEEDER

Model F-010 electromagnetic vibratory feeder is said to offer fast, high-capacity, rate-controlled feeding of bulk materials and small



parts. Electromagnet drive which produces 3600 vibrations per minute assures free flow of materials. Rheostat control affords instantaneous, fingertip adjustment of feed rates from a slow dribble through continuously variable settings to a max-

imum capacity of 3 tons per hour.

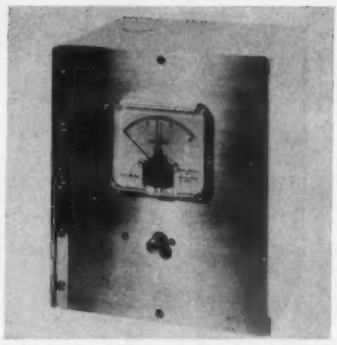
Absence of mechanical working parts is reported practically to eliminate maintenance. Lubrication never is required. The electromagnet drive is dust-tight. Standard flat-pan trough measures 5 in. wide and 24 in. long. Special flat-pan, half-round, V-shaped, or tubular troughs can be supplied. Unit will operate from either 115 or 230-v alternating current.—**Syntron Co.**, 540 Lexington Ave., Homer City, Pa.

For More Details Circle No. 455—Page 181

MOTOR OVERLOAD CONTROL

Electrical control device stops an overloaded electrical motor during the critical peak or starting load period. It also provides the protective functions of relays when more than normal running currents occur after starting. Called the safe-load relay, the unit is designed to respond instantly to momentary overloads and is applicable to nearly all types of motorized applications.

Action of the relay is controlled by a second or "limiting" pointer

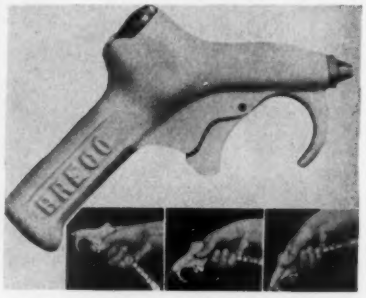


which can be reset close to the actual normal electrical power required by the drive. It does not interfere with the conventional indicating pointer's movement across the dial face of the relay. The relay also can be reset as instantly as it cuts off current to the drive involved.—**Baker Perkins Inc.**, 1000 Hess, Saginaw, Mich.

For More Details Circle No. 456—Page 181

AIR BLOW GUN

Designed for easy handling and maintaining accurate control of the air stream, this gun is contour-styled to provide a natural, comfortable grip. The trigger uses a cam action to operate the balanced piston valve, allowing finger pressure to remain the same regardless of air pressure and flow. Hook trigger guard also serves as a hanging device. An easily replaceable

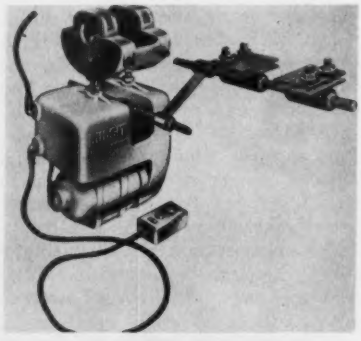


Teflon seal is used in the valve. Ten-inch extension nozzles for hard-to-get-at places are available in straight or curved design.—**Perfecting Service Co.**, 332 Atando Ave., Charlotte, N. C.

For More Details Circle No. 457—Page 181

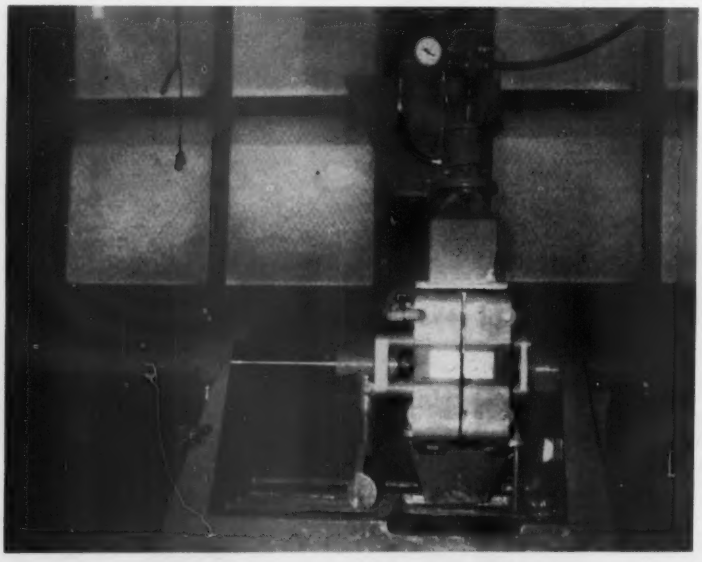
CRANE DRIVE UNITS

Cushion start models have been added to the company's line of drive units for converting manually-operated crane bridges to electric drive. The drives are designed for easy installation on many makes of



cranes with spans up to 55 ft and capacities to 10 tons. The cushion start is accomplished by a motor brake which spreads the time lapse from start to full bridge speed or from full speed to stop to a maximum of 3½ seconds, thus suppressing the load's tendency to swing due to inertia. Time lapses can be varied by adjustment. The cushion start feature is especially useful when ladles of molten metal are being moved. Models are available for 220, 440, or 550 v and have fully enclosed speed reducer, squirrel-cage motor, and magnetic con-

Shell Coreblower Has 40-lb Blow Capacity



Simplified shell coreblower is offered in two sizes—one handles coreboxes 8 x 8 x 6 in., the other 12 x 19 x 8 in. The machine is a true blow, no dump unit except for emptying. Blow head holds 40 lb of sand and is spring-loaded on a swinging arm to swing under 100-lb capacity hopper for automatic reloading. Blow head seals to corebox by air clamp. Quick-change, gas-fired heater plates also serve as corebox clamps. A 3-in. air cylinder opens and closes the corebox. All controls, valves, and gages are mounted on the machine. —**Theodore G. Baker**, 17044 Broadway Terrace, Oakland 11, Calif.

For More Details Circle No. 484—Page 181

tactor controller. Pushbutton stations operate on 24 v.—**Manning, Maxwell & Moore Inc., Shaw-Box Crane & Hoist Div.,** Muskegon, Mich.

For More Details Circle No. 458—Page 181

FOUNDRY COKE

Research, experimentation, and consultation with foundrymen indicates that coke produced by Norton Coal Co., Norton, Va., from a blend of coals from two seams possesses the qualities of firm structure, low ash, low sulfur, and high heat value. This beehive coke is available in sizes from 2 x 4 in. to 5 x 10 in. on order.—**Red Ash Pocahontas Coal Co.,** 318 Broadway, Cincinnati 2, Ohio.

For More Details Circle No. 459—Page 181

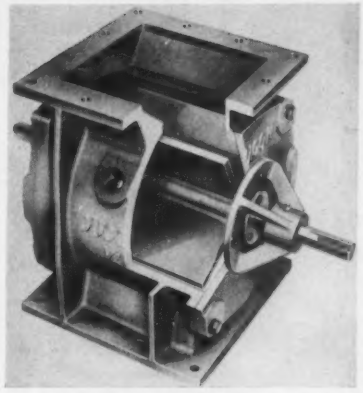
HOPPER CAR UNLOADERS

Line of heavy-duty air vibrators for unloading covered railroad hopper cars is designed with long piston stroke for maximum amplitude and thrust. The piston is the only moving part. These units have a stainless steel mounting head and use no body assembly bolts. "Free ride" design is said to provide continual, effective action, without jamming. Two models are available, a 3-in. piston size, 14¼ in. long, which weighs 68 lb, and a 4-in. piston size, 17½ in. long, which weighs 115 lb. They also can be used on bulk truck trailers.—**National Air Vibrator Co.,** 2372 W. Seventh St., Cleveland 13, Ohio.

For More Details Circle No. 460—Page 181

DISCHARGE GATE

Rotary discharge gate is designed for dust collection, pneumatic conveying, and feeding applications. Housings have outboard, removable bearings and a pressure-equalizing tap for applications involving a high pressure differential. Units are available in four styles: A four-blade, open-end rotor for low-pressure discharge applications as on cyclones and filters; a six-blade, open-end rotor for low-pressure pneumatic conveying systems; a six-blade, closed-end rotor for pressure pneumatic conveying systems, and a four or six shallow pocket blade rotor for handling materials which stick or build up.—**Ducon Co.,** 147 E. Second St., Mineola, N. Y.



For More Details Circle No. 461—Page 181

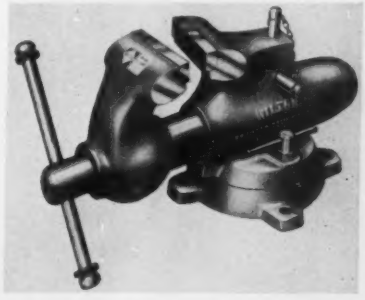
DIRECT-CURRENT WELDING

Two new arc-welding machines have been developed for industrial use. One is for application of gas-shielded metal-arc processes where equal burn-off rate and wire feed must be maintained. Current rating is 450 amp, continuous. The other machine is designed for light, medium, and heavy-duty direct-current metal-arc and inert-gas-shielded arc welding. Quick response and a well controlled arc are said to permit vertical and overhead work without excessive spatter or special adjustments. Current ratings are 60 to 375 amp with the 300-amp unit and 80 to 500 amp with the 400-amp unit.—**Air Reduction Sales Co.,** division of **Air Reduction Co.,** 150 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 462—Page 181

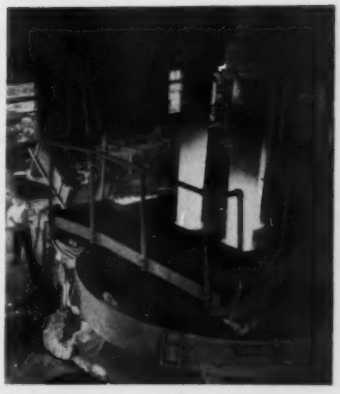
SWIVEL JAW VISE

The back jaw of the vise is on a pivot. When the tapered, vertical pin is removed, the jaw can be turned to right or left to lock angular work pieces in place. When the pin is reinserted, it holds the rear jaw parallel to the front jaw;



Alloy Provides Low-Cost Chromium Addition

High-carbon ferrochrome, known as refined charge chrome, is a low-cost source of chromium for stainless steel base charges, aircraft and bearing steels, tool steels, steel castings, and cast iron. It is a 4½ per cent carbon alloy available in maximum 2 per cent, maximum 3 per cent, and 10 to 12 per cent silicon grades. In addition to regular crushed sizes, it comes in 20 and 40-lb pigs. The alloy is magnetic, allowing handling by electromagnet. Crushed sizes are 2 in. by down, eight mesh by down, and 20 mesh by down. Nominal percentage composition of the varying silicon grades is the same: 50-55 Cr, 4.5 C max, 0.03 S max, 0.02 P max, and 0.17 Ni max. The illustration shows refined charge chrome being added to a 26,000-lb stainless steel charge in an electric furnace. In the cupola chromium recoveries of 85 to 90 per cent are said to be obtained consistently.—**Electro Metallurgical Co.,** a division of **Union Carbide Corp.,** 30 E. 42nd St., New York 17, N. Y.



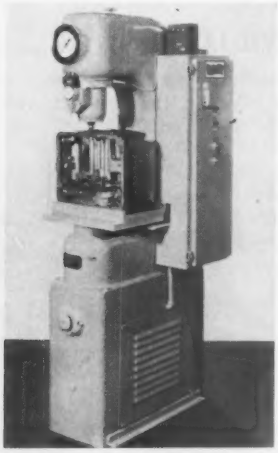
For More Details Circle No. 485—Page 181

By inserting a drift pin in the horizontal hole, it is said that the vertical pin can be unseated and removed easily. Both pins, connected by a chain, are furnished with the vise.—**Wilton Tool Mfg. Co.**, Schiller Park, Ill.

For More Details Circle No. 463—Page 181

PRODUCTION BRINELL MACHINE

High-production Brinell hardness testing machine determines workpiece position before it can operate. A limit switch in the table fixture



must be depressed by the workpiece before the knee-actuated cycle switch becomes energized. Cycle time is two seconds. The hydraulically applied load is adjustable. Colored lights on the machine indicate relative hardness of the part. The machine can distinguish a difference in diameter of impression of 0.1 mm. Throat depth is 10 in., maximum vertical opening is 14 in., and loads from 500 to 3000 kg can be applied. Machine will accommodate a wide range of parts, using different locators.—**Steel City Testing Machines Inc.**, 8817 Lyndon Ave., Detroit 38, Mich.

For More Details Circle No. 464—Page 181

GAS ABSORBER

Gas absorber is designed specifically to scrub vent gases and mists with compositions varying from acid to alkali and ranging from reducing to mild oxidizing conditions. It is particularly adapted to handling laboratory vent problems and small process ventilation.

The unit shell is fabricated entirely of ¼-in. polyester resin-bonded fiberglass. All interior spray piping and nozzles and the washer cell frames are made of polyvinyl chloride.

The first of three stages removes solids or other particulate matter. The second stage contains 4-in. deep fiberglass filter cells. Both of these stages are sprayed with an absorbing liquid automatically maintained at a fixed pH to minimize corrosion and consumption of neutralizing chemicals. The final stage removes entrained moisture.—**Buffalo Forge Co., Air Cleaning Div.**, Buffalo, N. Y.

For More Details Circle No. 465—Page 181

BIN VIBRATORS

Series of unit (bin) vibrators is designed for pinpoint installation on bins and hoppers up to 14-cu-ft capacity. Concentrated vibratory action insures continuous, smooth flow of materials at points where materials being handled show a tendency to pack, bridge, or stock.

Vibrators require no rectifier, work directly from either 50 or 60-cycle alternating current with no change in any component, and operate almost noiselessly. The primary vibration-producing element within the housing is a cast brass armature in which Alnico V magnets and suitable soft iron pole pieces are embedded.—**Eriez Mfg. Co.**, Erie 6, Pa.

For More Details Circle No. 466—Page 181

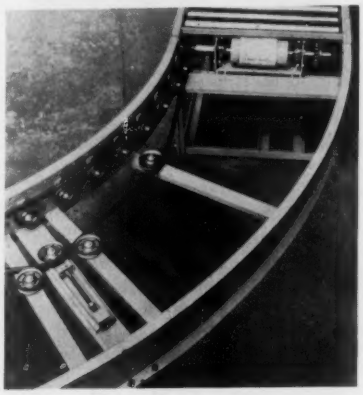
AIR COMPRESSORS

Double compressor units are rated at 20 and 25 hp, 125 and 175 psi, and displacement capacities from 96.4 to 129 cfm. The V-type multiple cylinder units are equipped with pressure switch and magnetically-controlled unloaders. A magnetic starter with selector switch for automatic start-stop operation or constant speed unloading is available, as are vertical air receivers for remote installation. Over-all length is 88 in., height 28⅜ in., and width 28 in.—**DeVilbiss Co.**, Toledo 1, Ohio.

For More Details Circle No. 467—Page 181

POWER ROLLER CONVEYORS

Live roller conveyors are actuated by heavy-duty V-belt drive. The



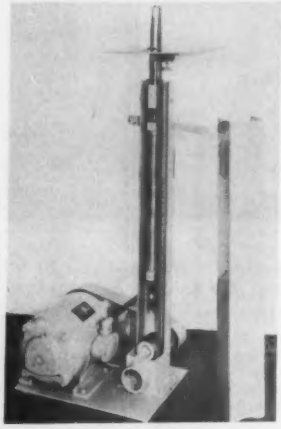
conveyors are manufactured with straight face or tapered rollers of various diameters and lengths to suit requirements of the application. Standard 4 ft, 6 in. and 6 ft radii are offered. Curves of 45, 90, and 180 degrees are available.—**Sage Equipment Co.**, Buffalo, N. Y.

For More Details Circle No. 468—Page 181

SEALING RESIN

Designed for sealing small cavities, cracks, and pores in metal surfaces, this liquid product has a sur-

Abrasive Belt Unit Grinds Inside Surfaces



Abrasive belt grinder is designed for work on small parts and for grinding inside surfaces of larger parts where clearance is a major factor. Shown with its protecting cover removed, the machine uses a 90-in. belt in widths of 1 or 2 in. It is intended for removal of flash or parting lines on nonferrous castings, sharpening special shape dies, and sanding plastic and wood items. Platen and slack of belt grinding can be performed.

In addition, a rubber-covered contact wheel and adjustable tilting table are available.—**Grinding & Polishing Machinery Corp.**, 2530 Winthrop Ave., Indianapolis 5, Ind.

For More Details Circle No. 486—Page 181

Inspection of 75-foot Salem Rotary Hearth Furnace at The Timken Roller Bearing Company plant at Canton, Ohio.

Rotary hearth roof of B&W IFB gives nine years of service at the Timken Company

Installed as a replacement for a super-duty firebrick sprung arch, over 35,000 B&W Insulating Firebrick were used in the roof of this rotary hearth furnace. Since installation nine years ago, just 300 9″ equivalents have been used for maintenance—less than 1% replacement!

Throughout this period the furnace has been operated at temperatures ranging from 2100 F to 2300 F on a continuous 6-day cycle at an average output of 20 tons per hour.

In addition to long service life, light-weight B&W Insulating Firebrick provide high fuel savings because of their low heat flow and heat storage. Light-weight IFB also simplify original furnace construction...make maintenance and patching easier.

For more information on long-lasting, cost cutting B&W Insulating Firebrick, consult your B&W Refractories Representative or send for Bulletin R-2-H.

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Circle 643 on Page 131

R-599

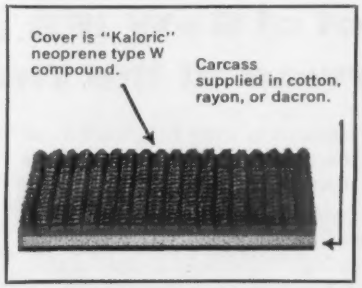
Kaloric belt installation conveying hot coke.

Quaker Kaloric conveyor belting WON'T HARDEN OR CRACK AT 325° F. Special cover doubles belt life

Hot-materials handling jobs can take a terrific toll in conveyor belting, unless the belt is expressly chosen for *specific* job conditions. And Quaker Kaloric—a conveyor belting which combines these "custom" qualities with a remarkable, heat-resistant cover—can actually cut your maintenance costs in *half*.

Here's why: Kaloric covers are sturdy neoprene type W compound, supplied with smooth or rough top finish of any thickness. Available any length, with any number of plies in widths up to 72". And there's a skim coat between plies for insulation and extra flex-life. Carcasses come in your choice of cotton, rayon, or "dacron," depending upon requirements of application.

Quaker Engineering Service, designed to help you determine which belt best fills your needs, is available through your Quaker distributor. See him soon. Or write *Quaker Rubber Division, H. K. Porter Company, Inc., Philadelphia 24, Pa., or Pittsburg, California.*



H. K. PORTER COMPANY, INC.
QUAKER RUBBER DIVISION

face tension lower than the capillary resistance of the smallest pores, it is claimed. After curing, the resin forms a seal resistant to acids, alkalis, and saline atmosphere. The material is available in several colors.—**Columbia Technical Corp.**, 61-02 31st Ave., Woodside 77, N. Y.

For More Details Circle No. 469—Page 181

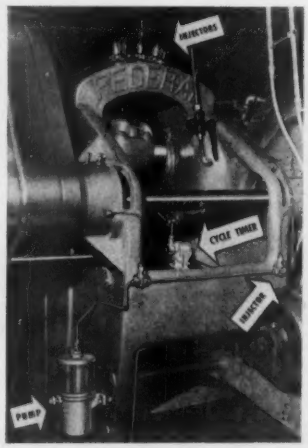
ALUMINUM ALLOY

Alloy is said to have high tensile and yield strengths with high elongation and good castability. Designated alloy 357, it handles about the same as alloy 356. The following typical permanent mold T-6 properties are listed for the new alloy: 48,000 to 50,000 psi tensile strength, 35,000 to 37,000 psi yield strength, and 6 to 10 per cent elongation.—**Reynolds Metals Co.**, Richmond 18, Va.

For More Details Circle No. 470—Page 181

AUTOMATIC LUBRICATION

Equipment is designed to provide automatic or semiautomatic lubrication of bearings on a machine while it operates. Air operated and controlled electrically, mechanical-



ly, or manually, the lubrication system is engineered for OEM applications or existing production facilities. Two models are available—one for low-pressure applications of oil, the other for high-pressure applications of grease or oil. The system is said to be easy to install.—**Lincoln Engineering Co.**, 5702-31 Natural Bridge Ave., St. Louis 20, Mo.

For More Details Circle No. 471—Page 181

SILICONE RELEASE AGENT

Silicone mold release and lubricating agent is packaged in a pres-

Silvery Pig Iron

SILVERY IRON GLOBE FERROALLOYS

Widely used in the production of gray iron, steel, and malleable castings and in open-hearth and electric steel making processes.

Produced in a blast furnace from an all-virgin ore burden, Globe Silvery contains little or no residual elements.

Globe piglets can be handled conveniently and economically.

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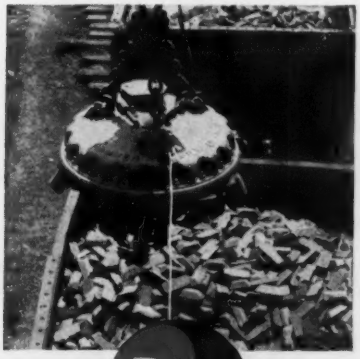

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Circle 645 on Page 131

surized spray container and is said to have a high silicone to freon ratio. It is intended for use in shell molding, die casting, and plastics work.—**Para Products Div., Foundry Rubber Inc.**, 5200 River Rd., Washington 16, D. C.

For More Details Circle No. 472—Page 181

MOTOR BRAKES

Line of direct-current motor brakes features rigidity, simplicity of adjustment, and easy servicing without disturbing torque adjust-

ment. The line includes 10, 13, 16, 19, and 23-in. wheel sizes and meets NEMA-AISE standards for use with NEMA 600 series mill-type motors and equivalent sizes of standard motors. All maintenance adjustments can be made from top of the brake. The main torque adjustment spring is at the bottom of the brake, totally shielded and protected. Brake shoes are self-aligning and are interchangeable end-for-end and with each other.—**Clark Controller Co.**, 1146 E. 152nd St., Cleveland 14, Ohio.

For More Details Circle No. 473—Page 181

AIR EXHAUST MUFFLER

Exhaust muffler for all pneumatic devices is said to reduce noise to the point of near silence. Designed for easy installation, the unit is made of corrosion-resistant metals; muffler cartridge is replaceable. Male and female connections are standard for pipe sizes from $\frac{1}{8}$ to $\frac{1}{2}$ in.—**Emco Pneumatic Corp.**, 1317 Locust St., Des Moines, Iowa.

For More Details Circle No. 474—Page 181

CONTROL INSTRUMENTS

A new line of instruments has been developed for electronic control of industrial process variables. Included are transmitters, recorders, controllers, and valve operators for control of pressure, flow, temperature, level, and other variables. Features of the instrumentation in addition to use of magnetic amplifiers

Ferroalloys of Highest Purity

SILVERY IRON GLOBE FERROALLOYS

Ferrosilicons
High-Carbon Ferrochromes
Low-Carbon Ferrochromes
Low-Carbon Ferrochrome Silicons
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Other Specialty Alloys

Produced in modern electric furnaces at Beverly and Jackson, Ohio, plants, from top quality raw materials, Globe ferroalloys are of highest purity and meet the most exacting requirements.

Shipments are by rail, water, or truck, in lump size or crushed.

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Circle 646 on Page 131

and transistors are choice of motion balance or force balance transmitters; tubeless electrical measurement converters mounted for front-of-panel accessibility; a new approach to control station design, and diversified installation arrangements using standard system components. —**Foxboro Co.**, Neponset Avenue, Foxboro, Mass.

For More Details Circle No. 475—Page 181

SNOW PLOW

Plow is designed for use on the company's ¾-ton powered wheelbarrow. Features include correct moldboard curvature and angle for rolling snow off to the side, lateral grooves in the moldboard to prevent snow from packing, relocation of connecting arms to minimize side

thrust, and removable, reversible cutting edge. The 50-in. blade is said to be easily installed and removed. While it is in use, the 10-cu-ft bucket can be filled with ballast or sand for spreading on icy areas.—**Prime-Mover Co.**, Muscatine, Iowa.

For More Details Circle No. 476—Page 181

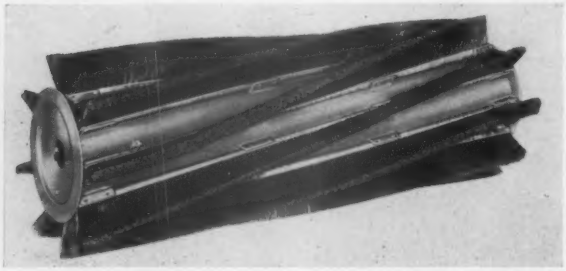
FLEXIBLE MASK GOGGLE

Improved goggle has larger, deeper flexible vinylite mask for greater area of protection and better facial fit. One-piece, removable plastic impact-resistant lens curves slightly to increase wearer's field of vision. The mask fits over all types of personal and safety Rx glasses. Available in clear or green frame, clear or green lens.—**American Optical Co., Safety Products Div.**, Southbridge, Mass.

For More Details Circle No. 477—Page 181

BIN VIBRATOR

Air-operated vibrator consists of a steel piston housed in a cast aluminum or iron cylinder block. The assembly is bolted directly to the bin or to a base plate welded on the



Interrupted face area on rotary unit allows individual strip brushes to flex and clean themselves

Brush Cuts Conveyor Belt Maintenance

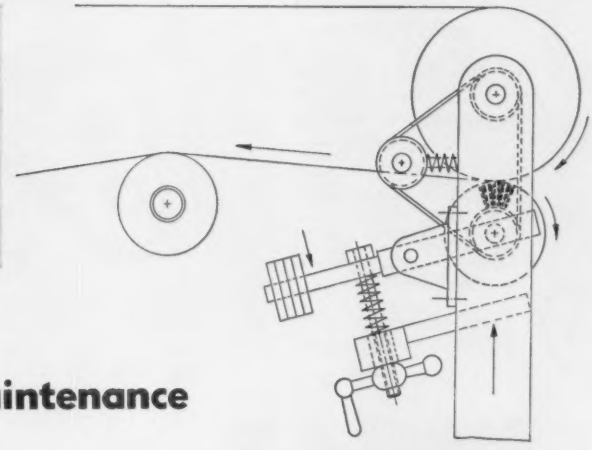
MODERN conveyor belts have simplified material handling, but they also present their own problems of maintenance. With conveyors handling sand, coke, and other bulk materials, one of the most troublesome problems involves what commonly is called "carryover."

Carryover is the material which adheres to a belt after the belt has passed over the header roll and unloaded. It sticks to the snubber roll and often to the idler rolls. In addition, carryover can drop on the floor area below or cause a serious dust problem. Buildup on the snubber roll can cause excessive wear or poor trim of the belt, with resultant lower belt speeds.

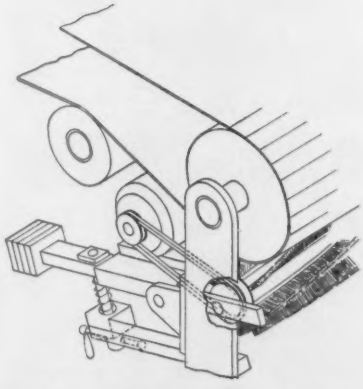
Various types of devices have been used to combat the difficulty. The recent development of a unit-type brush made up of heavy-duty, strip-type brushes formed helically is said to provide the most successful answer to the problem. This brush is made by Osborn Mfg. Co., Cleveland, which calls it the Rotamaster. Its interrupted face allows the individual strip brushes to flex and clean themselves. Use of synthetic materials yields brushes that last a year or more on many conveyor belt operations.

The brush should be situated at a point immediately after that at which the conveyor drops its load. This point usually is a short distance from the driving roll and ahead of the snubber or take-up roll. Depending on the conveyor, frame, and location of the header and snubber rolls, the brushing unit can be installed in a number of ways. Various widths are available, and brushes can be ganged together to provide whatever belt width is required.

For More Details Circle No. 487—Page 181



In this set-up a belt from the head roll drives the brush which is held against conveyor belt by an adjustable counterweight



In this set-up a separate power unit drives the brush, but brush contact is maintained similarly

International Automation Corporation presents

THE NEW TRIED AND PROVEN "BUHRER" SAND COOLER

LOW COST OPERATION
Less than 1 cent per ton (for direct operation).

FULLY AUTOMATIC
No operating manpower required

EASE OF MAINTENANCE
All moving parts readily accessible.

EFFICIENT COOLING
With practically no loss of fines

CAPACITY:
Up to 80 tons/hour.

MODEL SC-80
Patents pending.

Save by reducing casting defects.

Save by reducing the use of parting agents.

No loss of "Fines".

No loss of re-usable binder.

Save on binder additions.

Much better control of sand properties at the mill and at the molding stations.

Save on maintenance cost.

Better working conditions.

Perfect control of molding sand properties is an absolute necessity for any successful molding operation.

Strength, permeability, flowability, etc., must be accurately controlled in the mixing unit and, equally important, these properties must be stable to insure uniformity at the molding stations.

Only the use of a cool sand guarantees stability. Variations in sand properties, caused by varying evaporation of the moisture, are eliminated.

The use of hot molding sand not only causes control loss of sand properties at the molding stations, but is also directly responsible for many casting defects.

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Circle 647 on Page 131

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You'll find it pays to standardize on Acme melting pots and ingot molds. They reduce down time and replacement costs because they're cast from a special iron formula that combines strength with high temperature resistance. They improve quality and reduce rejects, too, because they're designed for even heat distribution without hot spots. If you melt any non-ferrous metals, take advantage of our more than 30 years' experience in this field. It's your assurance of consistent high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.

Quick delivery anywhere in the United States. Write for size list showing 40 standard sizes.

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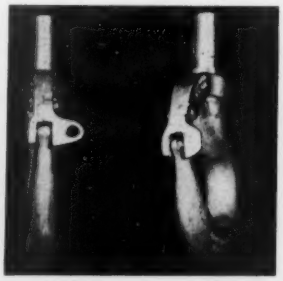
bin. With the aluminum cylinder, the 2-in. piston diameter model weighs 60 lb, the 4-in. unit, 79 lb. The vibrator is permanently lubricated with molybdenum disulfide, a dry film lubricant. Molybdenum disulfide is a molecular lubricant which is sprayed and then baked onto the piston and cylinder.—**Cleveland Vibrator Co.**, 2828 Clinton Ave., Cleveland 13, Ohio.

For More Details Circle No. 478—Page 181

SAFETY HOOK LOCK

Locking mechanism for large safety hoist hooks locks safety gate in place over tip of hook, giving



greater strength to the gate. The lock automatically drops closed upon contact with tip of the hook. The locking tip of the gate is available with or without ring as illustrated. The ring makes possible remote operation when hook is used over intense heat or chemicals.—**E. D. Bullard Co.**, 2680 Bridgeway, Sausalito, Calif.

For More Details Circle No. 479—Page 181

TRACTOR-SHOVEL

Model H-70, a four-wheel drive, rubber-tired tractor-shovel with 7000-lb carrying capacity has been developed to replace the company's Model HH. It features more power, more traction, stronger components, greater protection against dirt and dust, more efficient torque-converter, complete power shift transmission, power transfer differentials, power steering, pry-out bucket action, safety boom arms, power-boosted brakes, and other refinements. Gasoline or diesel engines are available.—**Frank G. Hough Co.**, 703 Seventh Ave., Libertyville, Ill.

For More Details Circle No. 480—Page 181

EXCESS AIR GAS BURNER

Designed for sealed-in firing in industrial furnaces, kilns, and other heat processing equipment, this excess air gas burner is said to pro-

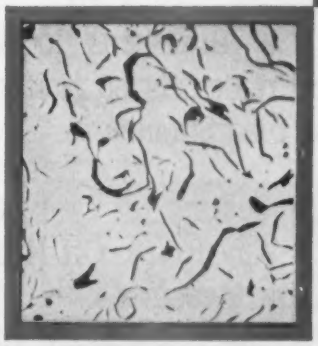
No. 8® GRAPHITIZER

TREATS GREY IRON EFFECTIVELY FOR LESS THAN 10¢ PER TON!

Thousands of foundries are already employing No. 8 because it is such an amazingly simple and accurate graphitizer. No. 8 is a powerful inoculant. It plants graphite *throughout* the molten metal. No. 8 gives castings a higher machinability rating. It reduces chill and hardness in thin sections and improves wear and shock resistance. No. 8 makes castings more metallurgically uniform and, most important of all, No. 8 graphitizer *substantially reduces the cost of metal control* (cost figures in several foundries are below 10¢ per ton of metal treated). No. 8 is easy to apply by funnel or envelope method. As the photomicrographs shown here indicate, No. 8 is effective for special metallurgical control. From every standpoint it will pay you to use No. 8, regularly. For further details write for Engineering Bulletin No. 2.

Base Iron

Photomicrograph from broken half of 1.25 arbitration bar of gray iron not treated with No. 8 Cupola charge was made up of 48% steel, 33% cast scrap, 19% malleable pig iron and 45 lbs. of silicon briquettes. Total charge was 2544 lbs. This iron tested to the following physical properties: Transverse Strength 2,497 lbs. (wedge bar) • Brinell Hardness 229 (wedge bar) • Total Chill Depth 41/32 in., Clear Chill 26/32 in. • Deflection 0.23 in.



Note how the iron treated with No. 8 has increased in deflection. Usually iron treated with No. 8 will show an increase from 10% to 30% in deflection over the base iron value—this means less cracked castings and more serviceable metal.

Treated Iron

Photomicrograph from broken half of arbitration bar of same base iron treated with 1 lb. per ton of No. 8. Holding time in ladle following addition of Graphite was less than 8 minutes. Note how the addition of No. 8 has destroyed the dendritic pattern and has given a normal flake pattern. The treated iron tested to the following physical properties: Transverse Strength 2,970 lbs. (wedge bar) • Brinell Hardness 217 (wedge bar) • Total Chill Depth 13/32 in., Clear Chill 10/32 in. • Deflection 0.31 in.

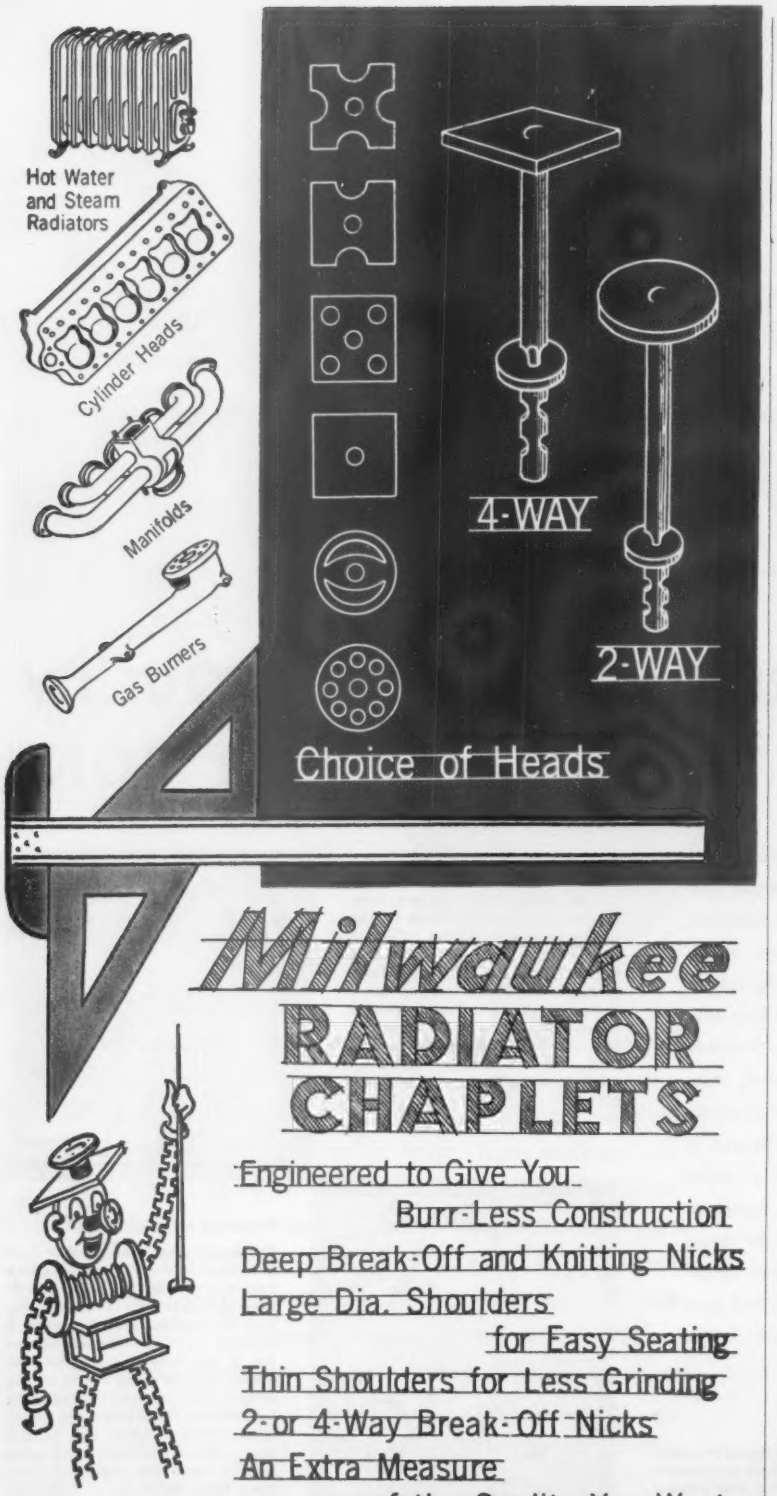
GF240-1

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

GRAPHITAR® CARBON-GRAPHITE • GRAMIX® POWDERED METAL PARTS • MEXICAN® GRAPHITE PRODUCTS • USG® BRUSHES

Circle 649 on Page 131

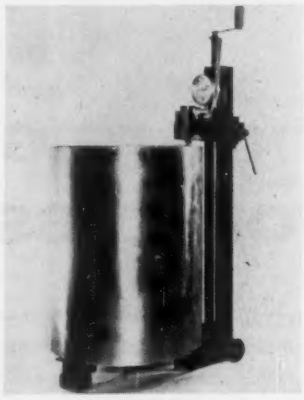


duce a stable flame even with 1000 or more per cent of excess air. Features claimed are good distribution, circulation and penetration of heat because of high velocities of hot combustion gases; minimum stratification of hot gases and development of localized hot spots; positive ignition at any burner setting on hot or cold furnaces; no burner flashback, and no need for a continuous pilot.—**Hauck Mfg. Co.**, 124-36 Tenth St., Brooklyn 15, N. Y.

For More Details Circle No. 481—Page 181

BRINELL HARDNESS TESTER

Brinell hardness tester is designed to make tests on parts ordinarily beyond the capacity of a standard test



machine. It has a 3½-in. throat and a capacity of more than 29 in. The instrument weighs 45 lb and can be used in any position. Completely portable, it uses a 5-mm or 10-mm carbide ball with any load ranging up to 3000 kg and is equipped with rollers for added mobility. Accuracy is guaranteed.—**King Tester Corp.**, 440 N. 13th St., Philadelphia 23, Pa.

For More Details Circle No. 482—Page 181

AIR MAKE-UP UNIT

Gas-fired air make-up unit is designed to temper and filter outside air entering ventilated areas. The equipment operates on natural, mixed, manufactured, or propane gas and prevents vacuuming in ventilated areas. Thus, fans and heating systems operate at normal design capacity for efficiency and economy. Four unit arrangements in four sizes are available for various capacities, Btu ratings, and pressure conditions.—**Aerovent Fan Co.**, 740 E. Ash St., Piqua 28, Ohio.

For More Details Circle No. 483—Page 181

BROKEN! —the COST BARRIER!

Announcing the *NEW LOW-COST Model 806-M*

"MIXALL" Heater-Mixer by C&S

PATENT PENDING

THE MANUALLY OPERATED "MIXALL" DELIVERS a Continuous High Output of Hot Coated Sand at the LOWEST POSSIBLE PRICE!

The Model 806-M "Mixall" is now readily available to get you started in your *hot-coat* process of coating sand for shell molds and shell cores. The initial cost is amazingly low. The output is extremely high . . . in some cases up to 2,000 pounds per hour! And fully automatic controls can be added at any time. For efficiency, for basic economy, investigate the many advantages the new Model 806-M offers. The coupon below will get you *all* the facts quickly.

Here's What the 806-M "Mixall" Offers:

- Lowest Initial Cost
- High Output . . . Up to 2,000 lbs. per hour
- Simple Controls
- Instant Temperature Reading
- Minimum Maintenance
- Rugged Construction
- Automatic Controls Can Be Added To Meet Future Needs

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GENTLEMEN:

I want to know more about the Model 806-M "MIXALL". Please send the full story on how it can mean lower production costs and higher quality.

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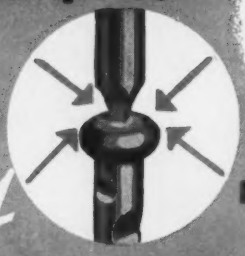
ADDRESS_____

CITY_____ ZONE_____ STATE_____

Circle 651 on Page 131

Only fine FANNER shoulder radiator chaplets

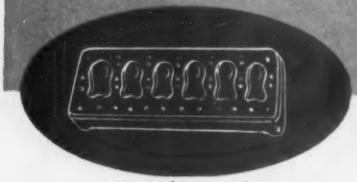
have the exclusive



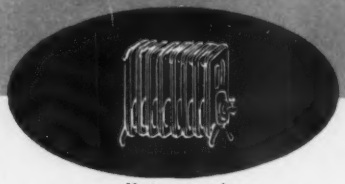
4 way break-off nick

to improve production... save money

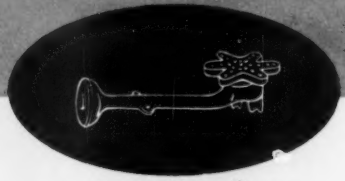
IDEALLY SUITED FOR



automotive castings



radiator castings



stove parts castings

EXCLUSIVE *New* 4-WAY BREAKOFF NICK

Provides maximum support during pouring, yet stem breaks off easily in any direction so that the few remaining after shake-out can be easily brushed off with no apparent surface marks remaining.

STAGGERED KNITTING NICKS

Provides better type of surface for knitting with molten metal, assuring thorough fusion and resulting in clean, solid castings.

STURDY SHOULDER AND SOLID RIVETED HEAD

Shoulder is designed and placed to permit chaplet to be set into pattern required distance without guesswork. Solid riveted head exactly at right angles to stem to insure that chaplet is always perfectly "true".

For better quality castings, for time and money savings in production use fine FANNER radiator chaplets. The exclusive four way break-off nick plus their other features speeds production of cleaner, sounder castings and reduces labor costs.

The development of the 4 way break-off nick is one more example of Fanner's constant study and engineering based on more than 60 years of experience in foundry practice.

Fine FANNER Radiator Chaplets are particularly suited for light pressure castings such as gas burners, radiator sections, manifolds and others. They are designed for use with the side of the greatest bearing surface against the green sand and will support approximately 5 pounds per square inch load.

Get complete information on FANNER Radiator Chaplets with the "4 way break-off nick" and other fine FANNER chaplets by writing for the FANNER Chaplet catalog today!

Qualified and specialized engineers in Fanner's Technical Service Division are available for consultation, without obligation, on problems of producing more intricate castings; developing increased strength, closer tolerances, and better quality; reducing machining and improving finish — both in ferrous and non-ferrous castings. Take advantage of the research and development work that Fanner has invested in this field to improve your profit picture! Simply direct your request to the address shown below.

THE FANNER MANUFACTURING CO.

Designers and Manufacturers of Fine Fanner Chaplets and Chills

BROOKSIDE PARK • CLEVELAND 9, OHIO

THESE FINE FANNER REPRESENTATIVES ARE AT YOUR SERVICE

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Hill & Griffith Co.
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CALIFORNIA
Barker Fdry. Supply Co.
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Los Angeles 58, Calif.

Pacific Graphite Co.
2522 Malt Ave.
Los Angeles, Calif.

Pacific Graphite Co.
40th & Linden Streets
Oakland, California

Snow & Galgiani
533 Second Street
San Francisco, Calif.

Barker Fdry. Supply Co.
120 S. Linden Avenue
S. San Francisco, Calif.

COLORADO
Mine & Smelter Sply. Co.
1422 17th Street
Denver, Colorado

ILLINOIS
Hill & Griffith Co.
4606 West 16 Street
Chicago 50, Ill.

Foremost Fdry. Sply. Co.
Chicago, Ill.
Mail Address:
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Milwaukee, Wisc.

The S. Obermayer Co.
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Goehringer Fdry. Sply. Co.
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Hill & Griffith Co.
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Cincinnati, Ohio

Federal Fdry. Sply. Co.
4600 East 71 Street
Cleveland 5, Ohio

Galion Fdry. Spec. Co.
131 W. Walnut Street
Galion, Ohio

Fenton Fdry. Sply. Co.
134 Gilbert Ave.
Dayton, Ohio

The S. Obermayer Co.
647 Evans Street
Cincinnati 4, Ohio

Huffman Fdry. Sply. Co.
1193 Main Ave.
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Freeman Supply Co.
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OREGON
LeGrand Ind. Sply. Co.
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The FANNER MANUFACTURING Co.
Brookside Park
Cleveland, Ohio

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Clayballs"

TRIFLES may make perfection, but clayballs are not trifles."—Anon.

Our trade literature and daily experience would seem to indicate that clayballs in molding sand have plagued foundrymen since the very beginning of this crazy, fascinating business. Oldtimers, with consolingly bad memories, may insist that this condition was unknown prior to the advent of the muller. And there are men even today who attribute clayballs to over-mulling or under-mulling of the sand.

Although these opinions may have some basis in fact, there is much more to the story than the mulling phase. Our various types of mechanical aerators have also been blamed as clayball producers, and in some foundries, western bentonite and fireclay have been banned because of the appearance of these nodular lumps. In many shops this undesirable condition is a constant source of irritation; in others it appears at infrequent intervals, and then again it may assume epidemic proportions.

Reclamation Helps—Shops enjoying a high degree of sand reclamation, with effective drying, lump-breaking, and screening, should have little trouble with clayballs, but such shops are in a decided minority. And, of course, where the famous three types of reclamation —heat, air, and water—are available, the sandman's job should be somewhat of a sinecure.

In most plants when clayballs appear, the sandmixer is besieged from all quarters. He is scolded for using too much water, not enough water, for overmulling, undermulling, for adding the wrong clay or other ingredients — and any other errors, real or imaginary, that may occur to the minds of his bewildered and frustrated superiors.

Let's stop putting all the blame on the muller-man, or his synthetic mixes. In the old days (prior to 1910), there were many naturally-bonded sands which displayed serious "balling" tendencies despite the absence of mullers or other mechanical mixers. Those were the good old days of windrow, shovel, and squirting hose—when every molder mixed his own sand with a flashing shovel, two fingers crossed, and a prayer on his lips.

Regardless of the type of sand, when we fail to disperse or disseminate our clay throughout the sand mass, it is inevitable that some of the batch will be clay-hungry, while in spots there will be segregation of clay, and it is here presumably that our clayballs develop.

To reduce the surface tension of both sand and clay, and to decrease mulling time, many foundrymen have resorted to a bentonite-slurry addition which, under favorable conditions, assertedly is effective. But most jobbing foundrymen of my acquaintance have not looked with favor on the slurry method. The arguments pro and con may or may not be logical, and since I am in no position either to support or disclaim them, perhaps it is best for the moment to label slurry as "unfinished business," pending further investigation and report.

Hard on the Finish — When clayballs are not actual scrap-producers, they invariably contribute to poor casting finish, and perhaps to other defects that lie within the realm of controversy.

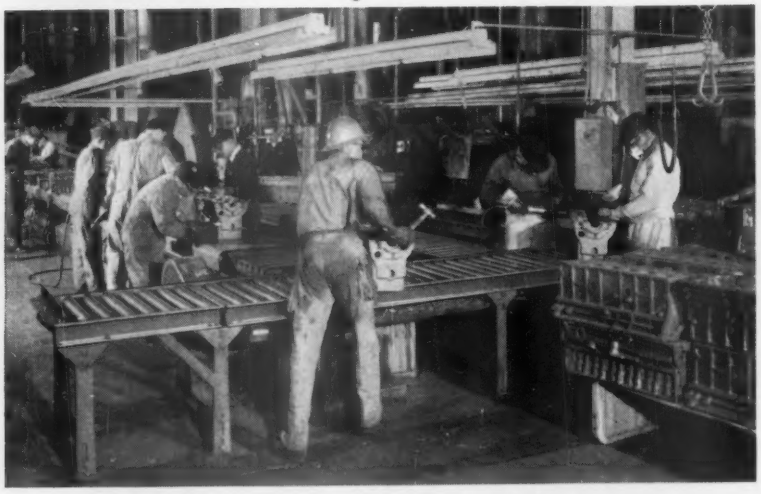
Acting on the suggestion of an enthusiastic (aren't they all?) salesman, I decided to experiment again with a wetting agent, in the hope of disintegrating clayballs and sand pellets, and to do it the easy way. My wetting agent is labeled "Arctic Syntex-036, a 100% non-ionic synthetic detergent."

Our tests were begun last July

Circle 652 on Page 131

Ask Standard

how to cut costs with conveyors



Cylinder blocks are chipped, ground and inspected on Standard Roller Conveyor line.

Eastern foundry simplifies cylinder block handling with roller conveyors

HERE'S another installation in which Standard Roller Conveyors are keeping heavy, bulky components flowing to machining and assembly points with minimum manpower and practically no time loss.

Easy to set up and exceptionally sturdy, Standard Roller Conveyors (live or gravity) can also be job-tailored to your specific materials handling problem — permanent or temporary.

And roller conveyors are only one of the many types of Standard conveyors. Others include belt, slat, chain, pushbar or sectional conveyors as well as spiral chute systems.

Standard Roller Conveyors are available from stock in a wide range of roller diameters, centers and frames.

Call the Standard engineer listed in your classified phone book or write direct for Bulletin 68 — Address Dept. N-10.

Why not take advantage of Standard's half-century of conveyor application experience. Consult STANDARD CONVEYOR COMPANY. General offices: North St. Paul 9, Minnesota. Sales and service in principal cities.

22 and continued daily for ten days. We added 50 lb of what might be termed a No. 70 bank sand to a customary batch of return system sand (1950 lb). The additives consisted of ½ gallon of western bentonite, ½ gallon of southern bentonite, 1 gallon of woodflour, 2 gallons of seacoal, and total moisture of 5.3 per cent. We shall assume (with tongue in cheek) that in evaluating our return sand, water was our only variable.

Alternate tests—one with tap water and the second with wet water — were made in consecutive order, with the tap water batch first, followed by a batch with wet water in the same amount. The difference in total moisture readings — and they were conspicuous—would seem to be due either to moisture variation in the two batches of return sand or to a faulty water meter. The samples to be tested were sealed in jars immediately following their discharge from the muller. Each sample was tested for moisture, permeability, deformation, green compression strength, green shear strength, dry shear strength, pH readings, and for evidence of clayballs and pellets.

A sample of 100 grams of sand, mulled and dried (but not washed), was subjected to standard screening to observe differences in the screen distribution. Flowability tests proved erratic and therefore were discontinued.

While these tests could not be considered conclusive, they did indicate values which might be attributed to the wetting agent. It was generally agreed that when Syntex was used in a one-tenth of 1 per cent solution, the sand had a more velvety feel. The screen-spread increased from one-half to a full screen, and the finer screens retained an increased proportion of the sample. Clayballs were fewer and visibly smaller. Permeability, strength, and deformation were unaffected when moisture readings were reasonably uniform.

Moisture the Factor—These tests, with and without benefit of wetting agent, were performed each day on an hourly schedule in the interest of reproducibility. Since it was practically impossible to control moisture closer than two-tenths of 1 per cent, plus or minus, a variation in results was noted, consistently indicating that a seemingly minor increase in moisture would lower both green compression and green shear strength, while increasing dry compression and dry shear. This result, of course, was not surprising.

The object of this investigation

Circle 653 on Page 131

ACHESON

dispersions digest

Reporting uses for

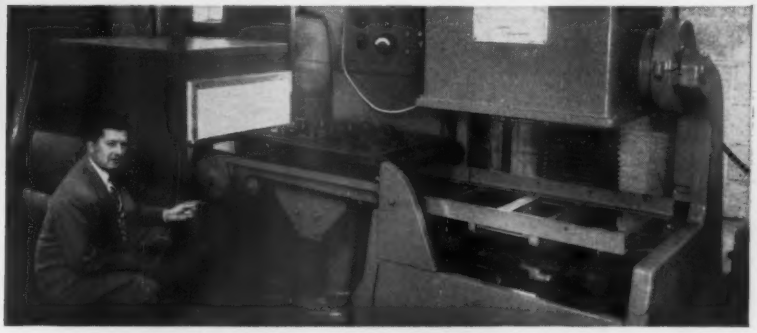
dag® BRAND DISPERSIONS

COLLOIDAL GRAPHITE, MOLY-SULFIDE, VERMICULITE, AND OTHER SOLIDS

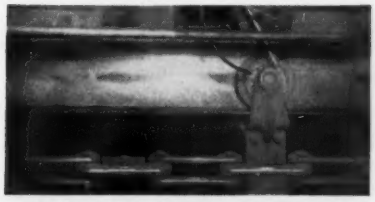
'DAG' DISPERSIONS SHRUG OFF HEAT, KEEP PRODUCTION ROLLING

With temperatures up to 1600° F. and above being generated in various types of industrial ovens, furnaces and kilns, lubricants for bearings and other moving parts must be very carefully selected. To satisfactorily resist oxidation, heavy pressures, and reduce wear on bearing surfaces, 'dag' colloidal graphite has been accepted as having all of the properties necessary to maintenance-free performance.

Dependable bearing lubrication of pattern carriages on shell molding machines is a "must" at Production Pattern and Foundry Co., Chicopee, Massachusetts. With five shell molding machines operating three shifts a day to supply their casting floor, uninterrupted service has to be maintained. These carriages shuttle back and forth between curing ovens and investing box . . . from 900° F. to 400° F. The three friction points that require special lubrication in this operation are: axle bearings for the 4-wheel pattern carriages; the pivots for the two-hitch mounts at each end of the carriages; and the link pins of the roller chains which propel the carriages back and forth across the bed of the machine. 'Oildag'—colloidal graphite in a petroleum oil carrier—is applied once a day to the bearings and pivot points, every 12 hours to the link pins. The result: where conventional oils and greases before had decomposed leaving a tarry residue or a non-lubricating soap, 'Oildag' retained its lubricating properties under both heat and load pressures. 'Oildag' is economical and heat resistant . . . necessary characteristics to its use in this application. With regular use, lubricants containing 'dag' colloidal graphite form a low-friction graphoid film that adheres tenaciously to the bearing surface, effectively resisting rupture, oxidation, and wear. Proof of this effectiveness? Life of these bearing segments now runs about 400 hours . . . *eight times longer than before!* According to Earl W. Jahn, President of Production Pattern and Foundry, "Until we discovered the dependable high-temperature lubrication performance provided by the Oildag mixture, we just weren't in business."



24 hours a day, at temperatures up to 900° F., Oildag provides maintenance-free lubrication of shell mold pattern carriages at Production Pattern & Foundry.



Studebaker-Packard Corporation's Foundry Department finds 'dag' No. 2404 saves on material, labor, and conveyor wear.

'dag' colloidal graphite solves conveyor lubrication for Studebaker-Packard. Their Foundry Department needed the answer to more efficient conveyor lubrication in baking ovens where operating temperatures ranged from 250° to 450° F. Heat caused gumming and partial decomposition of both the heavy greases and conventional non-graphited oils used. The residual deposit left resulted in "frozen" bearings requiring excessive down-time, as well as parts replacement.

By applying a dilution of 'dag' No. 2404—colloidal graphite in a mineral spirits carrier—on bearings, bushings, races and other critical parts, Studebaker-Packard found the ready-made solution. Application of these microscopically-fine particles was easily made through their automatic spray system. The excellent wetting action of the carrier deposited an unbroken film on all critical surfaces. The resulting dry film prevented accumulation of abrasive dust or sticky residue, allowing worthwhile savings in lubricant, labor, and conveyor wear. For further information on high temperature applications write for Bulletins 423 and 424. Address Dept. F-108.

ACHESON *Colloids Company*

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Call in your Acheson Service Engineer today.

Circle 654 on Page 131

was to attempt to determine whether a wetting agent could materially promote a more uniform dispersion of clay and the breakdown of dry pellets during the mulling cycle. In these experiments, due to unpredictable and even undetectable variations in the batches of return sand being mulled, deviation in results would dictate suspension of the tests for that day.

Compression vs Shear Strength—Despite impressive contradiction, there seems to be a direct relation in our sand between green compression strength and green shear strength. At a constant 12-lb green compression, our shear will hover close to 3 lb. If it exceeds 3 lb, say 3.2, we will have a tougher, better lifting sand. If it reaches 2.8 or lower, stick-downs occur and brittleness is all too evident. Either test alone fails to indicate moldability, but together they convey an understandable meaning. All of this is, of course, predicated on the assumption that moisture is closely controlled.

We must recognize clayballs, segregated sand pellets, and conglomerate grains as being quite dissimilar in character, yet they all reduce flowability, and thus contribute to poor casting finish.

Clayballs may range in size from $\frac{1}{8}$ to $\frac{1}{2}$ in. They may be either wet or dry, and when dry are usually hard. They are difficult, if not impossible, to break down by mulling. If wet and rammed against the pattern, your casting may reveal a pronounced "blow." Under less explosive conditions, when part or most of the water has been removed, the casting may suffer only surface "pits."

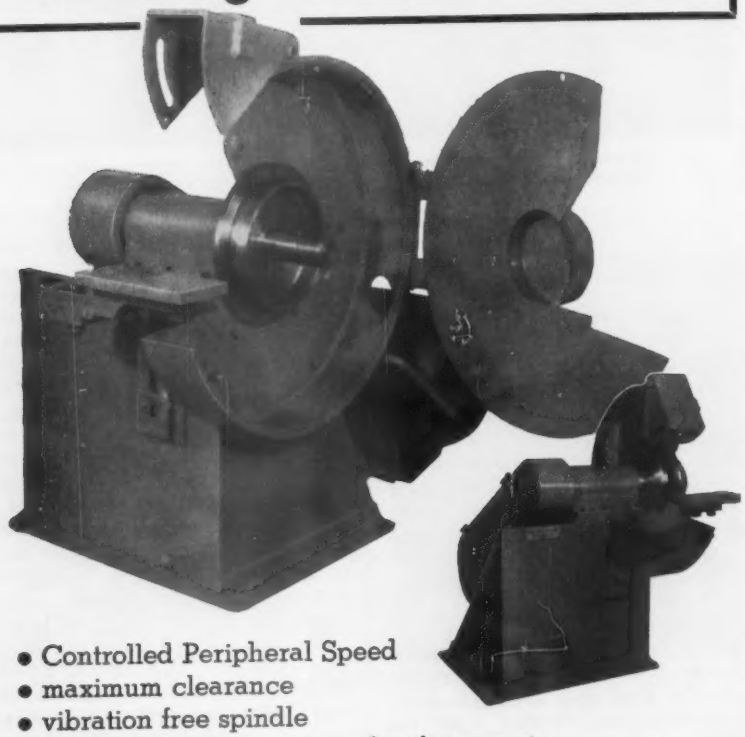
Segregated sand pellets are somewhat of a mystery to me. They range in size from $\frac{1}{8}$ to $\frac{1}{4}$ in., are usually dry, soft, and easily crushed between the thumb and forefinger. Four or five minutes of so-called intensive mulling still finds them isolated in the mass of moving sand, refusing to absorb moisture. Even the aerator fails to crush them.

It is quite possible that they are not mulled at all, but are formed on that part of the muller wall where, untouched by a scraper, they dry out, and as the emptying muller vibrates, they fall from their precarious perch to pass unimpaired through the flicking aerator, and to speckle the heap below like a nut-sundae. Perhaps they are relatively harmless, but I still regard them with suspicion.

Having had no recognizable trouble from conglomerate sand grains, I shall refer that problem to those of wider experience.

Our brief experiments with the wetting agent, Syntex, were not only interesting but at moments exciting and promising. Owing largely to the variable condition of our return sand, no very definite conclusions were reached, and it would be folly to insist or even intimate that any sand problem has been solved.

In tough grinding nothing beats a FOX



- Controlled Peripheral Speed
- maximum clearance
- vibration free spindle
- low maintenance cost • safety for operator.

FOX #1-24

10-15-20 horsepower: Grinding wheel 24 x 3 x 12".

FOX #1-30

15-20-25 horsepower: Grinding wheel 30 x 3 x 12".

FOX GRINDERS, Inc.

OLIVER BUILDING PITTSBURGH 22, PA.

Philadelphia Non-Ferrous Group Picks New Officers

The Philadelphia Management Group, Non-Ferrous Founders' Society, has named officers for the coming year: Chairman, Robert Thompson, Crown Non-Ferrous Foundry, Chester, Pa.; vice chairman, A. G. Eberle, Bushings Inc., Philadelphia; secretary - treasurer, Philip Keeley, Northern Bronze Corp., Philadelphia; national director, William Grimm, William Grimm Foundry, Philadelphia; director at large, William Leopold, Northern Bronze Corp., Philadelphia.

Circle 655 on Page 131

Quantity and Quality are *Guaranteed* when you specify Neville Foundry Coke

As a merchant producer of Neville Foundry Coke, Pittsburgh Coke & Chemical now has four batteries of ovens to serve you. That's your guarantee of reliable, continuing supplies when you specify Neville.

What's more, we guarantee the *quality* of our coke, too. For Neville Foundry Coke is made from clean, washed coals containing a high percentage of Pocahontas and carefully processed to produce stronger, denser, more uniform coke with more fixed carbon and less ash and sulphur. As a result, Neville Foundry Coke provides maximum temperature at the nose of the tuyere to give you hotter, cleaner, more fluid iron.

Let us fill *your* requirements today—with *guaranteed* Neville Foundry Coke, sized to your specifications.

NEVILLE **PIG IRON**

NEVILLE **COKE**

Quality Products for the Foundry Trade

COKE & IRON DIVISION
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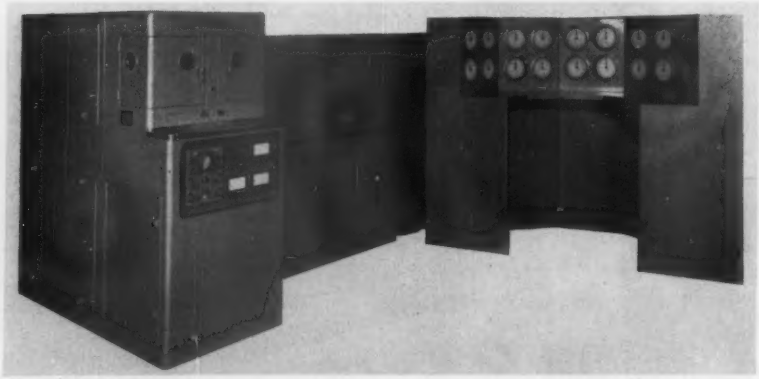
Ross-Meehan Completes

Modern Metallurgical Laboratory

Physical testing includes use of this 120,000-lb capacity tensile machine and equipment for high-temperature tensile and creep tests

Metallograph provides magnifications up to 2000X. Accessories are available for obtaining several different types of illumination



Direct-reading spectrometer can make a metal analysis in less than 5 minutes. It is particularly useful in high-alloy steel production

WE ARE convinced that the future of the foundry industry lies in meeting the critical engineering requirements of this modern jet age," states J. C. Lucas, president, Ross - Meehan Foundries, Chattanooga, Tenn.

"To this end," continues Mr. Lucas, "we have invested well over $150,000 in a new and modern metallurgical laboratory. We feel that the only way to meet the challenge of more stringent engineering applications is through the skillful combination of research, control, and technical knowledge. The new laboratory will provide the finest instruments and control and will make full use of the available technical skill."

Ross - Meehan Foundries, the "cradle" of Meehanite metal, produces more than 30 types of steels and 20 types of Meehanite. This production inflicts a considerable strain in attempting to maintain the tolerances set forth in specifications.

The steel foundry melting departments are equipped with one 2000-lb, basic-lined, direct-arc electric furnace and one acid-lined direct-arc furnace rated at 3-tons-per-hour melting capacity. Meehanite is made in two 48-in. cupolas, one water-cooled and acid-lined and the other basic-lined.

Combined melt of the two foundries is approximately 24,000 tons per year. Of this tonnage, more than 500 tons is high-alloy steel, 1500 tons is low-alloy, and 10,000 tons is carbon steel. In the Meehanite foundry, more than half of the melting production is alloyed.

Generally speaking, the task of meeting chemical specifications grows more difficult as alloy content increases. To add to the difficulty, some steel casting customers specify a closer concentration range of elements than ASTM or AISI specifications. The obvious solution was the analysis of the bath after the oxidation period and before the completion of alloy additions. Unfortunately, this goal could not be achieved by routine wet-method chemistry since the maximum allowable time estab-

New Protection For YOUR Equipment— At Temperatures Up To 3300°F

ALUNDUM castables offer unusual advantages to all industries using high temperature installations*

Will fire continuously up to 3300°F. This Harrop gas-fired furnace, recently developed by the Electric Furnace Division of the Harrop Ceramic Service Company, Columbus, Ohio, is particularly applicable to the firing of ceramic oxide bodies. Norton ALUNDUM 33-I Insulating Castable selected for the inner lining of the furnace and its roof, provided completely satisfactory protection under repeated tests at highest operating temperatures.

The new Norton ALUNDUM Castables are made in two types: 33-I Insulating and 33-HD Heavy Duty. At temperatures up to 3300°F both types have been extremely successful in protecting high temperature processing — in many industries and many different installations.

ALUNDUM 33-I Insulating Castable is made up primarily of pure aluminum oxide bubbles, tiny and countless. Forming a network of air spaces, it assures excellent insulation, even at highest commercial temperatures.

ALUNDUM 33-HD Heavy Duty Castable is chiefly composed of dense grains of pure aluminum oxide. It is recommended for forming dense monolithic surfaces in many types of furnaces where high temperature conditions are particularly severe.

Both 33-I and 33-HD Castables are very easy to store, mix and use. With them you can cast simple or complex shapes quickly and economically, replace more expensive pre-fired shapes, and cut maintenance and replacement costs to very lowest. Ask your Norton Representative for details, and for the folder *Two Norton Castables.* Or write to NORTON COMPANY, Refractories Division, 309 New Bond Street, Worcester 6, Massachusetts.

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REFRACTORIES
Engineered... Rx ...Prescribed

Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — **BEHR-MANNING DIVISION** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Why Gamble on Blast Cleaning Efficiency?

WHEN YOU CAN AVOID "DOWN TIME" AND CUT HIGH MAINTENANCE COSTS!

Blast cleaning equipment loses efficiency as it is used. This problem is so universal that three out of four machines in use today are operating at less than 60% efficiency.

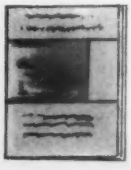
Loss of blast cleaning effectiveness means loss of profit, through excessive parts wear, increased cleaning time, and unnecessary high maintenance expenses. Fortunately, these production losses and excessive costs are avoidable.

IMPROVE YOUR PREVENTIVE MAINTENANCE

Your Wheelabrator Abrasive Engineer can help you to improve the efficiency of your blast cleaning operation through proper preventive maintenance. He is trained to show you how to "pinpoint" problem areas in machine performance and correct them before your blast cleaning efficiency suffers.

CLEANING COST CONTROL

Abrasive price per ton and part price per piece are meaningless unless you translate them into actual cost per operating hour on your machine. Your Wheelabrator Abrasive Engineer will also show you how to establish cost comparisons between competitive products to determine which blades, parts, and abrasives are least expensive for you.



For practical suggestions on how to achieve higher blast cleaning efficiency and lower cleaning costs, write to the Wheelabrator Abrasive Division. Ask for Bulletin 902-D.

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ABRASIVE DIVISION

WHEELABRATOR CORPORATION

505 South Byrkit Street Mishawaka, Indiana

Canadian Offices: Scarborough (Toronto) – Montreal

lished by the melting department was 10 minutes.

Spectrometer Speeds Analysis—The answer was a direct-reading spectrometer capable of an analysis in less than 5 minutes. After several months of investigation, a Baird-Atomic direct reader Model HBI unit was selected. This instrument is capable of analyzing 12 elements simultaneously. These elements and the ranges of concentration, in percentages, are as follows: Manganese, 0.01 to 10; silicon, 0.01 to 10; nickel, 0.01 to 40; chromium, 0.01 to 40; molybdenum, 0.01 to 10; copper, 0.01 to 10; vanadium, 0.01 to 10; columbium, 0.01 to 5; titanium, 0.01 to 5; tin, 0.001 to 0.10; lead, 0.001 to 0.10; and, aluminum, 0.01 to 5.00.

The operating principle of the direct-reading spectrometer is basically the same as that of a spectrograph. The sample is excited by a high-voltage arc or spark which causes the molecules to pass across a 3-mm gap between the graphite counter-electrode and the sample. During this process a radiation is emitted. This radiation is of a wavelength peculiar to the element or elements excited. The amount of radiation is, of course, directly proportional to the amount of the element present.

The radiation, or light, then passes onto a grating where it is reflected as a spectrum, thus organizing and sorting the radiation into elements of progressively increasing wavelength. The elements selected for analysis are identified by their wavelengths and resultant position in the spectrum. A photograph of this spectrum shows a series of lines, each one representing an element. The density of the "line" selected is read on a densitometer and the concentration is determined from a calibration curve. Density is plotted versus concentration.

Readings Are Direct—In the direct-reading spectrometer, the process is the same except that photomultiplier tubes are substituted for the film. The primary function of these tubes is to convert the light or radiation of the spectrum into energy. This amplified current is stored in a capacitor and discharged simultaneously with a standard capacitor—in the case of analyses of iron and steel, an "iron" capacitor. The length of time taken for the unknown capacitor to discharge to the level of the known or standard capacitor determines the length of time the clocks run and, consequently, the concentration of the element. This concentration then

Circle 658 on Page 131

ability to FORECAST

It isn't so much in doing it, but in doing it better and with cost-reducing results. That is the direction toward more profitable foundry operations—the plus ingredient that you get with Thiem products — and Thiem service.

Every year Thiem laboratory technicians and field men spend thousands of hours working with foundries on core and mold-making problems, giving direct service to improve casting surfaces. Contact your Thiem representative. He is ready to serve your foundry, too.

THIEM PRODUCTS INC.

MILWAUKEE 19, WISCONSIN

Manufacturers of foundry products exclusively

Circle 659 on Page 131

can be read from the clock dials.

With the direct-reading spectrometer, the procedure for making a heat of steel is greatly simplified. The charge is melted down and a sample sent to the lab for analysis. Within 10 minutes, results of the sample are in the hands of the furnace operator. Nonoxidizable alloy additions such as nickel and molybdenum are made on the basis of the melt-down analysis. Another sample is submitted after oxidation. For this analysis, chromium, manganese, and other oxidizable alloy additions are made. Before pouring any castings, a final analysis can be made of the heat *if* it is desirable. With this procedure, off-analysis heats virtually can be eliminated.

Magnifications — The second research and control instrument installed was a Bausch & Lomb metallograph. This instrument has the eyepieces and objectives necessary for magnifications from 25 to 2000X. In addition, it has accessories for dark-field and polarized light illumination, oblique lighting, and half-aperture illumination. The image can be viewed through the microscopic eyepieces or on a screen. Microphotographs can be made through a standard 5 x 7 in. camera.

Polishing equipment, for micrographic sample preparation, is the latest and finest available for the volume of work anticipated. Mounting is done with a Buehler speed press, which uses bakelite premolds, in about 6 to 7 minutes. A Buehler wet surfacer suffices for rough grinding of metallographic specimens as well as for spectrographic samples. Fine grinding is completed on a Buehler grinder which uses 240-320-400 and 600 grit silicon-carbide paper. Rough and final polishing is accomplished on a Buehler polishing table with three 8-in. wheels charged with a special compound of variously graded particles. It is fast cutting, and disturbed metal is held to a minimum. For steel and iron samples, 6-micron, 1-micron and ¼-micron compounds are used on nylon and velvet cloths, respectively.

Stainless steel samples are etched on a Buehler electrolytic etcher which employs 10 per cent chromic acid or other electrolytes, as conditions require.

The dark-room for processing photomicrographs is approximately 8 x 12 ft. Ceramic tile walls, formica-top cabinets, and stainless steel sink, tanks, and trays make the necessary cleanliness relatively easy. Films are processed in a water-jacketed unit with a thermostatic valve which controls the flow of hot and cold water, thus maintaining a constant temperature of 68° F plus or minus 1 per cent. An Omega D-2 enlarger and B & J contact printer provide printing facilities for photomicrographs and other photographs. Print processing solutions also are controlled to a temperature of 68° F plus or minus one per cent. The print dryer has a capacity of about eighty 5 x 7 in. prints per hour.

Testing for Physicals — Physical testing, the final test governing the metallurgical acceptability of a heat, is performed in a 16 x 20-ft laboratory. Tensile and compression testing is done on a Baldwin-Lima-Hamilton tensile testing machine rated at a capacity of 120,000 lb total stress or 600,000 psi on a standard 0.505-in.-diam specimen. An auxiliary furnace is provided for high-temperature tensile testing up to 1800° F, as well as a load maintainer for creep testing.

Other physical testing equipment

6 ways to improve foundry efficiency

...with J-M Transite Core Plates

Photo courtesy Palmyra Foundry Co. Palmyra, New Jersey

Transite Core Plates are smoothly sanded, made of asbestos-cement, specially designed by Johns-Manville for holding cores during baking or drying. They give you all these important advantages:

1. **Simplify Handling**—their light weight speeds production.
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6. **Save Money**—cost less, last longer than many other materials. Cut to your requirements in sizes up to 48″ x 60″. Write for free sample and further information. Address Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

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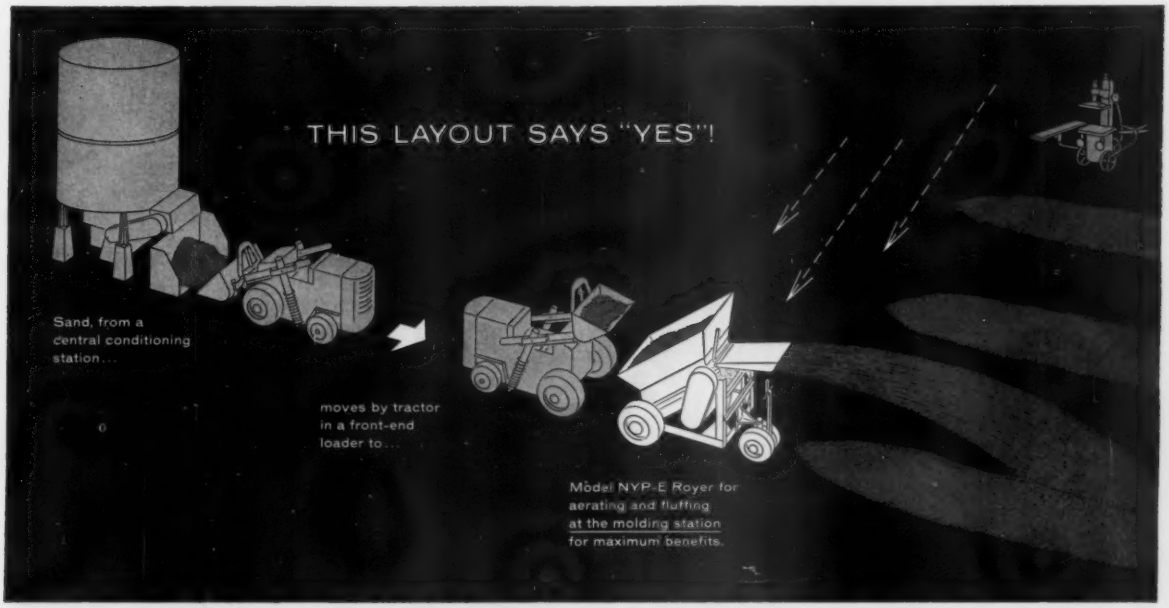
ASK YOURSELF . . . "CAN WE GET BETTER SAND, AND A BETTER SYSTEM, WITH A ROYER?"


THIS LAYOUT SAYS "YES"!
Sand, from a central conditioning station...
moves by tractor in a front-end loader to...
Model NYP-E Royer for aerating and fluffing at the molding station for maximum benefits.

HERE'S HELP FOR YOU

Bulletin NY-54 for complete details and "specs" . . . an experienced Royer engineer to help you work out the system. Either or both for the asking.

Here is a positive cost-cutting sand conditioning system that falls within the budget limitations of the small or medium semi-mechanized foundry. It delivers better sand without adding to time or manpower requirements, and without the expense of complete mechanization. It gains the advantages of fluffing *after* handling, as the final step at the molding station.

An integral part of this practical system is the Royer Model NYP-E Sand Separator and Blender. It can be moved swiftly from station to station, delivering cooled, aerated, fluffed, perfectly conditioned sand right where it's wanted. With it you can *really* get all the advantages of central system sand control.

Maybe your system "is different." There's a versatile unit of the Royer "NY" Series to fit it . . . and *improve* it. As the photos show, there are stationary models for easy installation at the discharge of a muller or in conveyor systems. But, however you use it, the Royer vastly improves sand, saves time and money, improves yield and quality of castings—all at a *fraction of a cent per ton of sand.*

Note the special literature offer. Write, wire or phone today.

Teamed with front-end loader, a Royer NYP-E Portable moves from floor to floor in a grey iron foundry. What used to be caked, packed sand from mulling, now is a cool, fluffy pile.

"NY" Stationary in a different role—taking direct 1800 lb. discharge of stiff sand from a 9 ft. muller in a steel foundry.

Foundrymen insert versatile "NY" machines into conveyor systems wherever convenient. Result—perfect sand . . . no time hold-up.

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FOREMOST IN SAND CONDITIONING EQUIPMENT

Circle 661 on Page 131

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- Molded in plaster for extreme accuracy
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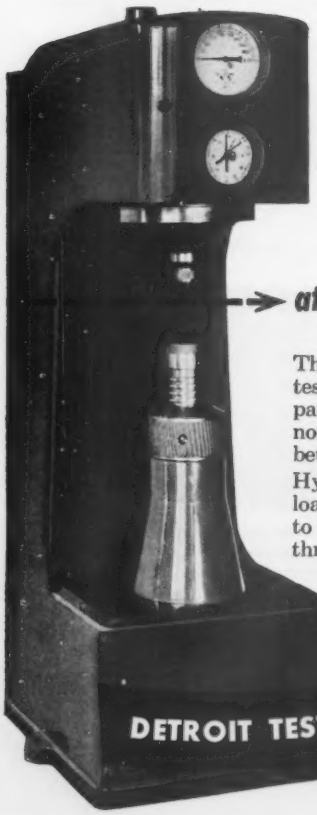
Circle 662 on Page 131



Brinell Testing

→ at production line speeds! →

This direct reading Brinell hardness tester tests round or flat parts *fast*. No grinding of parts is necessary and the operator simply notes that the dial indicator needle falls between pre-set tolerance hands.

Hydraulically applied standard Brinell test loads are used. Foot control allows operator to test parts as quickly as he can move them through the machine.

Write for more information on all our Brinell testing machines.

DETROIT TESTING MACHINE COMPANY

9382 *Grinnell Ave., Detroit 13, Mich.*

Circle 663 on Page 131

includes a Sonntag Charpy impact machine with cooling facilities for testing at 290° F below zero. Hardness tests are made with Brinell and Rockwell hardness testers.

A Leeds & Northrup magnetic permeability meter also is available. Magnetic permeability is becoming an increasingly important gage for quality of stainless steel. It basically evaluates the amount of ferrite in an austenitic matrix.

The building which houses this modern control equipment is in itself unusual. It contains approximately 1400 ft. Heating and air conditioning are supplied by four separate units. The spectrometer room is heated by an 8-kw electric furnace and a 3.5-hp air conditioner. Temperature is held to a tolerance of 2° F. Relative humidity must be held to a maximum of 40 per cent. This can be maintained only by cooling the air to the dew point, thus releasing the moisture, and reheating to the comfort setting of 78° F. This requirement means, of course, that the furnace and the air conditioner both operate all year. The other five rooms of the laboratory are heated by a 20-kw electric furnace and cooled by a 7.5-hp air conditioning unit.

It is felt that with this modern laboratory Ross-Meehan Foundries can fulfill three obligations: 1. Insure that quality of product is maintained at the highest level commensurate with customer requirements. 2. That a liaison between customer and producer is maintained through engineering requirements and the applicability of casting metallurgy. 3. That sufficient research is available to broaden the field of casting service and better meet increasingly critical engineering requirements.

Non-Ferrous Founders' Group Names Officers for 1958-59

The Cleveland Management Group of the Non-Ferrous Founders' Society has elected the following officers for the 1958-59 season: President, William A. Gluntz Jr., Gluntz Brass & Aluminum Foundry Co.; vice president, Walter O. Larson, W. O. Larson Foundry Co., Grafton, Ohio; treasurer, D. B. Kennedy, Gluntz Brass & Aluminum Foundry Co.; secretary, Eugene Hervey, Winters Foundry & Machine Co., Canton, Ohio; advisers, Benjamin E. Weimer, Wellman Bronze & Aluminum Co., and Alfred W. Newman, Cleveland Aluminum Casting Co.

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FOR UNIFORM RESULTS

- Produces sound, accurate cores because of uniform high quality and Dow-Therm processing.
- Helps increase core capacity from conventional up to 50% because it responds well to a wide range of oven temperatures.
- Production keeps humming, for L-O cores are tough, yet flexible . . . afford complete collapsibility.
- Helps in all types of casting because there's a selection of 20 grades.

SMITH L-O 45 LIQUID PARTING
FAST ACTING...POWERFUL

- Low-cost, time-proved formulation provides a smooth, uniform coating that permits molding sand to slip free from pattern.
- One application will give perfect results from 5 to 40 molds.
- Ideal for sand-slinger operations as hot sand does not remove parting film.
- Completely seals surfaces against moisture. The result is faster, cleaner operation.
- Its time and work-saving advantages mean increased production at low cost.

SMITH SLUSHOL
TO ARREST RUST

- At low ultimate cost, stored metal parts can be kept free from rust, either indoors or outdoors.
- Provides a tough, tenacious, transparent surface; will not flake or crack off.
- Provides durable protection whether applied by spraying, dipping, or brushing on castings or finished metal parts.
- Easily removed by petroleum solvents.

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Circle 665 on Page 131

Literature for Foundrymen

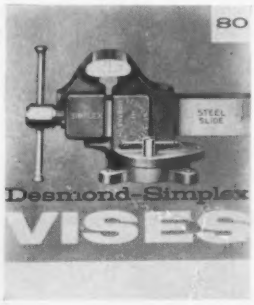
Cooling Foundry Sand

Twelve-page bulletin discusses hot molding sand problems, gives reasons why sand should be cooled, and relates developments in cooling methods with cost comparisons. The cooling of sand in mullers is discussed at length in this presentation by C. E. Wenninger, technical director, **Beardsley & Piper**, division of **Pettibone Mulliken Corp.**, 2424 N. Cicero Ave., Chicago 39, Ill.

For More Details Circle No. 401—Page 181

Vises

Catalog 80 describes manufacturing operations and features in a line of vises including machinists, wood-



working, and drill press and milling machine models. A page is devoted to illustrations of repair parts of the various models and sizes of vises. —**Desmond-Stephan Mfg. Co.**, Urbana, Ohio.

For More Details Circle No. 402—Page 181

Insulating Refractories

Brochure IN-115A gives data on insulating firebrick, castable refractories, and troweling and gunning refractories. Lightweight aggregates and fills for making insulating refractory concrete and for insulating irregular spaces also are covered. — **Johns-Manville**, 22 E. 40th St., New York 16, N. Y.

For More Details Circle No. 403—Page 181

Crucibles

Form 1795 covers physical and chemical characteristics, recommended uses, and availability of refractory crucibles for metal melting. A table lists recommended crucible material and pertinent remarks for melting 32 metals commonly handled in crucibles.—**Norton Co.**, Worcester 6, Mass.

For More Details Circle No. 404—Page 181

Conveyors

Folder describes power belt and wheel and roller gravity conveyors. Installation views are included.—**Conveyor Dept., A. B. Farquhar Div., Oliver Corp.**, 44 N. Duke St., York, Pa.

For More Details Circle No. 405—Page 181

Epoxy Resin

Hysol 6040 epoxy resins and their properties when used with various hardeners are covered in technical data bulletin.—**Houghton Laboratories Inc.**, Olean, N. Y.

For More Details Circle No. 406—Page 181

Dust Collection

Booklet presents an analytical description of a recently installed dust collection system for collecting nearly 5 tons of dust an hour.—**Buell Engineering Co.**, 123 William St., New York, N. Y.

For More Details Circle No. 407—Page 181

Zircon Wash

A zircon wash developed for use on cores and molds produced with air-setting binders is described in bulletin.—**G. E. Smith Inc.**, 246 Washington Rd., Pittsburgh 16, Pa.

For More Details Circle No. 408—Page 181

Woodworking Machinery

Booklet PS-5611 on woodworking machinery for pattern shops covers disc and spindle sanders, circular and band saws, router-borers, milling machines, lathes, surfacers, jointers, and general patternshop equipment. **Oliver Machinery Co.**, 445 Sixth St. N.W., Grand Rapids 4, Mich.

For More Details Circle No. 409—Page 181

Sling Chains

Bulletin DH-39 describes line of sling chains in one, two, three, and four leg styles with sling hooks, sling grab hooks, and foundry type hooks. Also presented are data on selecting proper chain size for individual requirements, working load limits for various leg styles and angles, basic components to assemble in a sling chain, and information on assembly and repair. —**American Chain Div., American Chain & Cable Co.**, York, Pa.

For More Details Circle No. 410—Page 181

Furnace Electrodes

Folder highlights recent developments in graphite electrodes for electric furnaces and lists stock threaded graphite electrodes and their corresponding nipples. Special data are included for Detroit furnace electrodes.—**Electrode Div., Great Lakes Carbon Corp.**, 18 East 48th St., New York 17, N. Y.

For More Details Circle No. 411—Page 181

Conveyor Systems

Conveyor systems and their component products are shown in action with on-the-scene photographs and line drawings. Emphasis is

placed on conveyors with roller-equipped bottom boards and pallets and on auxiliary equipment such as mold dumps, pallet raisers, turntables, transfer cars and other materials handling equipment.—**Nomad Equipment Div., Westover Corp.**, Dept. F, 3110 West Fond du Lac Ave., Milwaukee 10, Wis.

For More Details Circle No. 412—Page 181

Vibrating Conveyors

Catalog 66, "A Guide to Proper Selection of Vibrating Conveyors for Bulk Materials," gives information on material handling operations, flow charts, illustrations of different types of applications, ca-

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pacities, dimensions, and other selection data. Cutaway views show design and construction of the reciprocating drive.—**Ajax Flexible Coupling Co.**, Westfield, N. Y.

For More Details Circle No. 413—Page 181

Load Measurement

Information on electronic indicators and recorders for measuring pressure, force, tension, and weight using load-cells is presented in Data Sheet ND46-20(1). Recording weight of scrap charge to a foundry furnace is illustrated.—**Leeds & Northrup Co.**, 4934 Stenton Ave., Philadelphia 44, Pa.

For More Details Circle No. 414—Page 181

Fluid Line Couplings

Complete data on standard line of quick - connect, quick - disconnect couplings for air, hydraulic, and vacuum lines are given in general catalog. — **Snap - Tite Inc.**, Union City, Pa.

For More Details Circle No. 415—Page 181

Swing Frame Grinders

Bulletin 110 describes heavy-duty and extra-heavy-duty abrasive belt swing frame grinders. — **Grinding and Polishing Machinery Corp.**, 2530 Winthrop Ave., Indianapolis 5, Ind.

For More Details Circle No. 416—Page 181

Conveying Systems

Bulletin on belt conveying systems covers types of belting, conveyor beds, deflectors, and other components. — **Alvey-Ferguson Co.**, 2729 Disney St., Cincinnati 9, Ohio.

For More Details Circle No. 417—Page 181

Contact Wheel

Compress canvas contact wheel for use with abrasive belts on backstand grinders is described in Folder 509-PW-6.—**Divine Brothers Co.**, 200 Seward Ave., Utica 1, N. Y.

For More Details Circle No. 418—Page 181

Belt Cleaner

Bulletin 258 features technical data, specifications, and illustrations on a spring-type conveyor belt cleaner.—**Stephens-Adamson Mfg. Co.**, Ridgeway Ave., Aurora, Ill.

For More Details Circle No. 419—Page 181

Fire Extinguishing Equipment

Handbook of safety codes outlines mandatory and recommended procedures for maintaining, protecting, recharging, and inspecting fire extinguishing equipment commonly used throughout the metalworking industry.—**Fire Equipment Manufacturers' Association**, One Gateway Center, Pittsburgh 22, Pa.

For More Details Circle No. 420—Page 181

Dust Precipitator

Descriptive data, dimensions, and efficiencies of a high-velocity electronic dust precipitator are given in Bulletin 258.—**American Air Filter Co.**, Dept. PD, 215 Central Ave., Louisville 8, Ky.

For More Details Circle No. 421—Page 181

Beryllium

Twelve-page booklet discusses industrial hygiene aspects of beryllium metal, oxide, alloys, and other beryllium products. A section deals with casting and master alloys.—**Beryllium Corp.**, Box 1462, Reading, Pa.

For More Details Circle No. 422—Page 181

Shakeout Lubrication

Bulletin 559 describes use of a nonfluid oil for lubricating shakeouts and vibrating screens. A sim-

ATLANTIC WHEELS

cut work fatigue to a man-saving minimum!

Ask the men who use them — Atlantic Grinding Wheels have a smooth, floating action that requires less grinding pressure, keeps operators fresher for longer periods throughout the daily work schedule. Even where metal removal is roughest, you can count on Atlantic Wheels for fast, cool, clean-cutting performance . . . depend on their rugged resinoid bond for maximum on-the-job safety.

A trial run in your plant will quickly prove their worth in money-saving terms. Have an Atlantic representative recommend the right wheel for your specific requirements. Meanwhile, write for your free copy of the Atlantic Grinding Wheel Catalog. Atlantic Abrasive Corp., 534 Pearl Street, South Braintree, Massachusetts.

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Compact in size, complete in precision design and workmanship, this rugged instrument assures the highest standards of speed, accuracy and dependability. Heavy-duty, shock-resisting movement is housed in a balanced unit that is easy to handle...reaches any point.

Alnor Portable Pyrocons come in scale ranges to 2000° F., with thermocouples for every application. You'll find full details on the Pyrocon exactly suited to your operations in Bulletin 4257. Send for your copy now. Write: Illinois Testing Laboratories, Inc., Room 511, 420 N. LaSalle St., Chicago 10, Illinois.

Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

Circle 667 on Page 131

ilar lubricant for pneumatic tools and equipment also is described.—**New York & New Jersey Lubricant Co.**, 292 Madison Ave., New York 17, N. Y.

For More Details Circle No. 423—Page 181

Box Dumping Attachment

Catalog sheet describes fork truck attachment for dumping drop-bottom boxes. Application, design, and operation information, specifications, and engineering drawings of the attachment and typical containers are included.—**Elwell-Parker Electric Co.**, 4205 St. Clair Ave., Cleveland 3, Ohio.

For More Details Circle No. 424—Page 181

Sand Mullers

Specifications on seven models of the company's F-series mix-muller available in batch capacities from 300 to 24,000 lb are given in bulletin. How intensive mulling works, and factors to be considered in mulling, also are related.—**National Engineering Co.**, 549 West Washington Blvd., Chicago 6, Ill.

For More Details Circle No. 425—Page 181

Cranes

Bulletin 15000-5-58 illustrates and describes a new line of heavy industrial cranes available in spans up to 120 ft, capacities 5 through 25 tons, and equipped for floor or cage operation.—**Manning, Maxwell & Moore Inc., Shaw-Box Crane & Hoist Div.**, Muskegon, Mich.

For More Details Circle No. 426—Page 181

Fork Lift Trucks

Catalog BU-451 on fork lift trucks tells the engineering, design, construction, and operating story of the units. Truck and engine features are illustrated.—**Engine-Material Handling Division, Allis-Chalmers Mfg. Co.**, Milwaukee 1, Wis.

For More Details Circle No. 427—Page 181

Bucket Elevator

Brochure gives capacities and specifications on bucket elevators available in two models. Both models are offered in heights to 50 ft.—**Bosworth Mfg. Co.**, Mills Road, Avon, Ohio.

For More Details Circle No. 428—Page 181

Air Compressors

Bulletin LAH-158 describes a line of medium-pressure air compressors employing two intermeshing screw-rotors as the compressing parts. Design and construction data on the

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CERAMIC
STRAINER
CORES

SAVE WITH THESE STOCK SIZES:

P.P. Inc. No.	Dia.	Thickness	No. of Holes	Hole Dia.
1-CAA	1"	5/16"	3	1/8"
175-EED	1¼"	3/8"	7	1/4"
175-GHD	1¾"	7/16"	10	1/4"
175-GFD	1¾"	7/16"	8	1/4"
2-IGD	2"	1/2"	9	1/4"
2-EHD	2"	3/8"	10	1/4"
213-GGD	2⅛"	7/16"	9	1/4"
225-EFF	2¼"	3/8"	8	5/16"
225-ENC	2¼"	3/8"	16	7/32"
25-END	2½"	3/8"	16	1/4"
275-GRD	2¾"	7/16"	19	1/4"
3-INF	3"	1/2"	16	5/16"
3-GPF	3"	7/16"	18	5/16"
35-GRF	3½"	7/16"	19	5/16"
35-GRH	3½"	7/16"	19	3/8"
35-INH	3½"	1/2"	16	3/8"

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Circle 668 on Page 131

compressors, and ratings and capacities for each of the 17 sizes listed, are included. — **Roots-Connersville Blower,** 900 West Mount St., Connersville, Ind.

For More Details Circle No. 429—Page 181

Protection Device

Bulletin 2002 gives specifications, application wiring diagrams, and operating principle of a device to sound an alarm and/or shut down heating equipment when a preset maximum safe operating temperature has been reached.—**Illinois Testing Laboratories Inc.,** 420 N. La Salle St., Chicago 10, Ill.

For More Details Circle No. 430—Page 181

Centrifugal Fans

Bulletin BB-105 covers a line of backward-blade fans for heating-ventilating and air-conditioning systems, power plant installations, and industrial processes. Full specifications, selection, and arrangement data on 19 basic size fans are included.—**General Blower Co.,** Morton Grove, Ill.

For More Details Circle No. 431—Page 181

Electrical Switches

Catalog 62c covers basic switches suitable for either alternating or direct current commercial and industrial applications.—**Micro Switch,** division of **Minneapolis-Honeywell Regulator Co.,** Freeport, Ill.

For More Details Circle No. 432—Page 181

Lift Truck Attachments

Catalog describes complete line of mechanical and hydraulic lift truck attachments for use with forks or for carriage mounting.—**Little Giant Products Inc.,** 1550 N. E. Adams St., Peoria 3, Ill.

For More Details Circle No. 433—Page 181

Roller Conveyors

Descriptive data, specifications, and illustrations of three new lines of stock roller conveyors are given in Bulletin 80.—**Logan Co.,** 200 Cabel St., Louisville 6, Ky.

For More Details Circle No. 434—Page 181

Boxes, Pallets, Skids

Catalog 90 presents a line of corrugated steel boxes, pallets, and skids for unit load handling.—**Union Metal Mfg. Co.,** Canton 5, Ohio.

For More Details Circle No. 435—Page 181

Sponge Iron

Twenty-page manual on sponge iron explains melting stock, analysis of sponge iron, carbon and carbon

Up in the air over a consistent melt quality?

Junior's out to prove he's handy at hooky! He's hidden behind the homestead—but those buoyant bubbles are making the rounds! This is one peace pipe that's going to open hostilities!

THEN IT'S NO TIME FOR PIPE DREAMS . . . not when uniformity of quality counts! That's when you turn to Keokuk Silvery Pig Iron, the superior form of silicon introduction—famous for its unvarying uniformity of results. Handle by magnet, furnace-charge by weight, or count the pigs for equal accuracy. For Aluminum producing, it's Keokuk Silicon Metal. Nothing finer!

Keokuk Electro-Metals Company Keokuk, Iowa; Wenatchee Division, Wenatchee, Washington

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Keokuk Silvery Pig—the superior form of silicon introduction—is available in 60 and 30 lb. pigs and 12½ lb. piglets in standard analysis or alloyed to your specifications. Silicon metal and ferrosilicon are supplied in standard sizes and analyses.

Circle 669 on Page 131

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IMPROVES SAND MOLDS and CORES!

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WILNER BIRCHWOOD FLOUR

- **Compensates for Sand Expansion . . . Keeps Finishes Smoother**
- **Provides Reducing Atmosphere . . . Keeps Finishes Cleaner**
- **Aids Sand Flow Around Patterns . . . Keeps Details Sharper**
- **Improves Collapsibility . . . Speeds Up Shakeout**
- **Helps Bonding Action . . . Improves Green Strength**
- **Increases Porosity . . . Protects Against Blowholes**

Here's a super-refined hardwood flour ideally suited to the high purity requirements of shell mold mixes, green sand molds, and core sand mixes. Consistently pure, uniform in mesh size and water content from batch to batch, it combines top quality with outstanding economy. Find out how WILNER BIRCHWOOD FLOUR will improve *your* castings and cut molding costs. Send coupon for specifications and free testing sample.

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COMPANY .....

STREET .....

CITY..... ZONE..... STATE.....

Circle 670 on Page 131

potential, and the importance of purity. The role of sponge iron for quality steelmaking in acid open-hearth, basic open-hearth, electric-arc furnace, and the high-frequency furnace is covered. — **Hoeganaes Sponge Iron Corp.**, Riverton, N. J.

For More Details Circle No. 436—Page 181

Firebrick

Bulletin R-52, printed on three-hole-punched card stock for inclusion in notebooks, summarizes technical data published previously concerning the company's firebrick.— **Refractories Div., Babcock & Wilcox Co.**, 161 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 437—Page 181

Parting Agents

Properties, advantages, and effective working concentrations of three silicone parting agents for use in shell molding operations are presented in Data Sheet SF-1128.— **Silicones Div., Union Carbide Corp.**, 30 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 438—Page 181

Motors

Bulletin GEA-6713 covers wound-rotor motors for crane or general industrial applications. They are available from 5 through 150 hp with adjustable, varying speed. Ratings and dimensions are shown.— **General Electric Co.**, Schenectady 5, N. Y.

For More Details Circle No. 439—Page 181

Vibratory Equipment

Specifications, descriptions, and illustrations of vibratory bulk material handling equipment and other company products are presented in Catalog 586.—**Syntron Co.**, 540 Lexington Ave., Homer City, Pa.

For More Details Circle No. 440—Page 181

Mold Dryer

Bulletin 805 describes gas-fired portable mold dryer for dry sand practice on pit molds and flask molds too large for ovens.—**Foundry Equipment Co.**, 1831 Columbus Rd., Cleveland 13, Ohio.

For More Details Circle No. 441—Page 181

Conveyor Rollers

Specifications and illustrated construction features on light, medium, and heavy-duty rollers for conveyors are given in Bulletin 43.— **Standard Conveyor Co.**, North St. Paul 9, Minn.

For More Details Circle No. 442—Page 181

SAFETY FIRST

Built into Your Wheels!

Conforms to ASA Safety Code requirements for cupwheel guards

CARROLL'S SAFETY-GUARD INSERTS

Give you BUILT-IN Operator Safety and Top Performance.

This radically new Safety Guard Insert with its integrated revolving guard gives you the all-important safety factor with increased wheel strength and efficiency.

Added economies in production are gained from the ready-made molding form provided by the Guard. True dynamic balance, back flatness and concentricity, show consistently close tolerances within .010 T.I.R.

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Circle 671 on Page 131

Michigan Conference To Study New Foundry Developments

Annual AFS Michigan Regional Foundry Conference has for its objective the examination of new developments in molding, melting, material, design, and marketing, as well as the determination of how to put these developments to profitable use.

The two-day meeting will be held at the University of Michigan, Ann Arbor, Mich., Wednesday and Thursday, Oct. 15-16.

Program details follow:

Wednesday, Oct. 15

Morning:—**Shell Molding,** Joseph Orloff, Saginaw Malleable Iron Div., GMC, Saginaw, Mich.

Investment Casting and Related Processes, Charles W. Schwartz, Misco Precision Casting Co., Whitehall, Mich.

CO_2 Process, Frank Ilenda, Diamond Alkali Research Center, Painesville, Ohio.

Parlanti Permanent Mold Process, Dr. C. A. Parlanti, Niforge Engineered Castings Inc., Boston.

Diecasting, J. Louis Pedicini, Congress Die Casting Div., Tann Corp., Detroit.

Sand Molding, Graphite Molding and Other Processes, Dr. R. A. Flinn, University of Michigan.

Luncheon:—Film, **"The Buhrer Automated Molding and Pouring Method."** Comments by A. H. Homberger, American Automation Corp., New York.

Afternoon:—**Melting Sessions** — Ferrous, **New Developments in Cupola Practice,** W. Levi, Lynchburg Foundry, Radford, Va.

Nonferrous, **Induction Furnace Melting of Brass and Bronze Alloys.**

Steel, **New Developments in Steel Melting,** Paul Gouwens, Armour Research Foundation, Chicago.

Gray Iron, **New Developments in Gray Iron Melting,** Howard H. Wilder, Vanadium Corp. of America, Chicago.

Nonferrous, **Induction Melting of Aluminum and Zinc Alloys for Sand, Permanent Mold, and Diecasting Industries.**

Banquet: Washtenaw Country Club.

Thursday, Oct. 16

Morning: Sand, **Synthetic Sands for Ferrous and Nonferrous Foundries,** Clyde Sanders, American Colloid Co., Chicago, and W. Shartow, Chevrolet-Saginaw Gray Iron Div., Saginaw, Mich.

Design, **Stress Analysis and Design,** Robert Franck, Superior Steel & Malleable Castings Co., Benton Harbor, Mich.

Material, **Castings and the Automobile Industry,** Conrad Orloff, GMC Technical Center, Warren, Mich.

Luncheon: **New Developments in Practical Application of Atomic Energy,** Roger Leatherman, Phoenix Project, University of Michigan.

Afternoon: Tour of reactor at University of Michigan and new Automotive-Engineering Laboratories.

Western New York Chapter, AFS, Elects New Officers

Western New York Chapter, American Foundrymen's Society, has elected new officers to serve during the 1958-59 chapter year: Chairman, L. B. Polen, Allegheny Ludlum Steel Corp.; vice chairman, A. J. Heysel, E. J. Woodison Co.; secretary, R. E. Turner, Queen City Sand & Supply Co.; and treasurer, Martin W. Pohlman, Pohlman Foundry Inc. Directors elected to serve three-year terms are R. E. Lumley, Buffalo Pipe & Foundry Co.; S. Santomieri, Worthington Corp.; and D. G. Kreuder, Foundry Services Inc.

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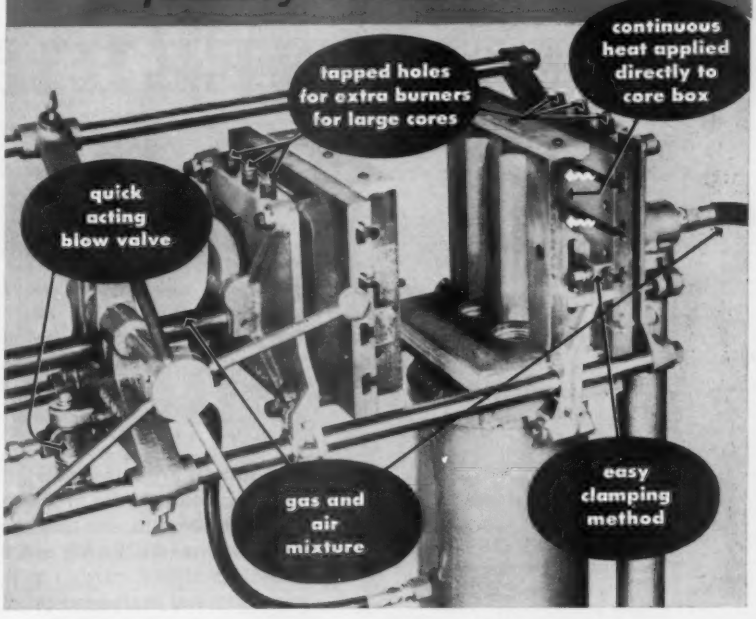
MACHINE *brings shell core molding within reach of every foundry because...*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continuous heat applied directly to core box
quick acting blow valve
gas and air mixture
easy clamping method

1. It uses your present core boxes with little or no alterations necessary. No need to build new core boxes.
2. Continuous heat applied directly to back of core box. Thin sections most desirable. Fast and efficient.
3. Operates on any type of gas, natural, manufactured, mixed or bottled. Economical.
4. Quick change for short runs. Clamps provided.
5. Produces intricate small cores in four gang boxes at the rate of ten per minute, and cores up to 9" diameters or 18" lengths at the rate of one per minute.
6. Various thicknesses of core can be obtained by length of time invested.
7. Eliminates the need for driers or pasting.
8. Shell cores produced offer Unexcelled Permeability . . . Collapsibility . . . Accuracy . . . Easy Shake-Out.
9. Low initial cost . . . $1097, F.O.B. Portland, Oregon.
10. Your Dependable Shell Core Machine comes completely equipped with accessories and assembled ready to operate. Just hook up to gas and compressed air lines. Shipping weight, crated, 400 lbs.

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Lloyd Canfield Foundry & Eqpt. Co. *Kansas City, Kansas*
Shallway International Corp., *Los Angeles, Calif., and Crawley, England*

Circle 672 on Page 131

A Lester B. Knight & Associates, Inc. Case History

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The Knight organization's practical "working type" approach to foundry problems results in specific, tangible benefits. For one client, Knight recommendations reduced manufacturing overhead 58%. Installation of flexible budgets, carried to the foreman level, improved methods and increased productivity, substantially reduced costs in all departments (without capital expenditures). These and other changes—in manufacturing approach and work-in-process methods—made possible a doubling of profits over the last three years.

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Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1956	794,581	171,181	245,421	376,230	.....
1957					
June	58,547	11,585	17,180	29,700	88,086
6 mo.	408,916	80,058	123,908	203,821	.....
July	52,173	10,447	16,322	25,339	89,430
Aug.	55,735	10,996	18,398	26,319	89,826
Sept.	58,692	11,367	17,820	24,900	93,720
Oct.	64,140	11,570	20,543	31,936	91,817
Nov.	58,898	10,411	18,611	29,793	91,860
Dec.	53,102	9,302	16,724	26,978	86,323
Total	751,656	144,151	232,326	369,086	.....
1958					
Jan.	57,845	10,724	18,082	28,937	77,067
Feb.	50,695	9,601	15,456	25,279	75,647
Mar.	50,547	9,311	15,255	25,918	63,600
Apr.	44,948	9,531	13,369	21,956	60,317
May	44,093	9,312	13,648	21,091	59,666
June	40,701	8,644	13,679	18,292	64,259
6 mo.	288,829	57,123	99,489	141,473	.....

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1956	951,868	557,636	812,905	479,563	138,963	78,073	.....
1957							
June	72,556	44,639	59,829	36,892	12,727	7,747	76,331
6 mo.	471,349	288,784	390,537	241,410	80,792	47,374	.....
July	57,748	34,876	45,100	27,290	12,648	7,586	80,694
Aug.	65,426	39,644	55,320	33,781	10,106	5,863	84,876
Sept.	62,457	38,397	52,281	31,658	10,176	6,739	83,385
Oct.	77,667	45,989	66,043	39,269	11,624	6,720	82,995
Nov.	67,904	38,085	55,564	31,036	12,340	7,049	80,074
Dec.	60,425	34,343	48,694	27,218	11,731	7,125	74,863
Total	862,976	520,118	713,539	431,662	149,437	88,456	.....
1958							
Jan.	62,734	34,920	51,440	28,516	11,294	6,404	67,292
Feb.	54,650	31,006	45,419	25,381	9,231	5,625	59,047
Mar.	51,708	29,624	43,368	24,333	8,340	5,291	54,330
Apr.	50,695	29,388	41,794	23,605	8,901	5,783	47,664
May	48,306	26,656	40,092	21,710	8,214	4,946	46,603
June	51,882	31,077	42,910	25,679	8,972	5,398	48,260
6 mo.	319,965	182,671	265,083	149,224	54,952	33,447	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1956	966,306	866,545	57,522	.....
1957				
June	70,959	63,910	3,590	44,232
6 mo.	455,000	407,108	25,470	.....
July	60,621	54,847	3,010	44,175
Aug.	71,233	64,953	3,278	40,446
Sept.	70,804	64,470	3,243	40,298
Oct.	81,836	74,391	3,693	39,063
Nov.	70,187	63,944	3,006	34,249
Dec.	65,708	59,606	3,046	31,509
Total	875,389	788,319	44,696	.....
1958				
Jan.	69,707	63,294	3,327	30,341
Feb.	58,356	52,579	3,202	27,243
Mar.	60,157	54,007	3,395	25,434
Apr.	59,311	53,271	3,385	25,621
May	57,506	51,634	3,077	22,867
June	57,124	51,967	3,001	21,578
6 mo.	362,161	326,752	19,387	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1956	36,168	33,580	.....
1957			
June	2,973	2,817	6,765
6 mo.	17,539	16,540	.....
July	2,544	2,384	6,964
Aug.	2,315	2,150	6,222
Sept.	2,279	2,071	5,705
Oct.	2,192	2,093	5,318
Nov.	1,920	1,806	4,802
Dec.	1,533	1,408	4,823
Total	30,322	28,452	.....
Jan.	1,881	1,756	5,227
Feb.	1,803	1,730	5,589
Mar.	1,975	1,860	5,555
Apr.	2,215	2,141	5,555
May	2,422	2,196	5,200
June	2,205	1,996	5,515
6 mo.	12,501	11,679	.....

PRODUCTION WORKERS

Estimated Number	June 1958	May 1958	June 1957
Ferrous	159,800	159,800	203,100
Nonferrous	43,900	42,700	57,900
Average Weekly Earnings			
Gray Iron	$82.43	$80.86	$85.24
Malleable Iron	85.81	81.45	84.89
Steel	88.81	87.00	96.41
Nonferrous	93.60	90.87	91.88
Average Weekly Hours			
Gray Iron	36.8	36.1	39.1
Malleable Iron	37.8	36.2	39.3
Steel	36.7	36.1	41.2
Nonferrous	40.0	39.0	40.3

Source: Bureau of Labor Statistics.

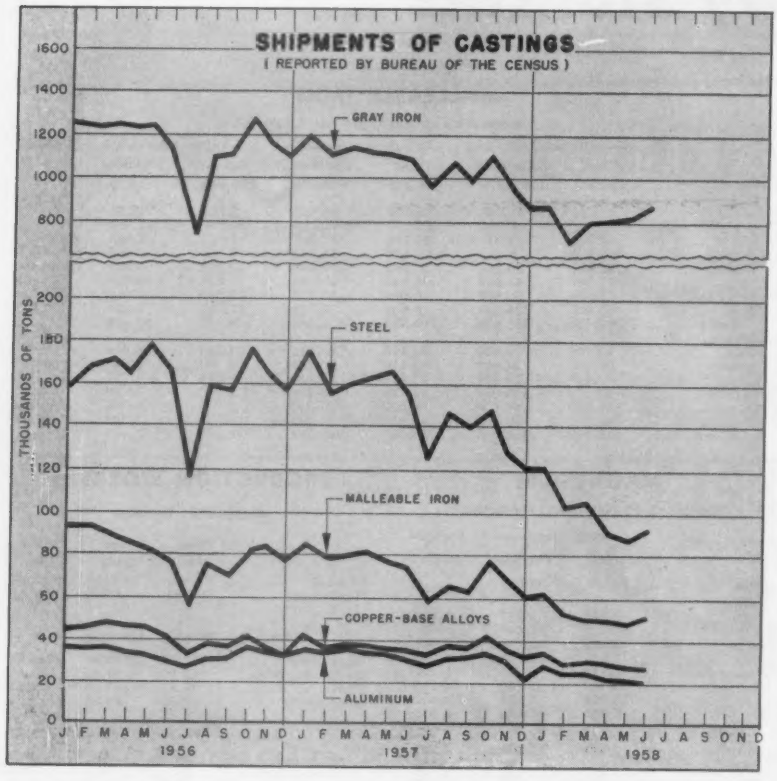
GRAY IRON CASTINGS—SHIPMENTS (Net tons[1])

	All Castings		Miscellaneous Castings		Nodular Iron Castings	Heavy Steel Ingot Molds	Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	Total	Total	Total[3]	Total[3]	
1956	13,860,527	7,960,391	8,265,526	3,647,991	.....	2,624,146	406,191	1,746,902	817,762	.....
1957										
June	1,058,464	599,494	630,513	274,115	10,207	193,640	32,087	131,360	70,864	853,012
6 mo.	6,740,588	3,665,241	4,185,417	1,791,667	.....	1,284,037	201,685	700,130	368,118	.....
July	954,102	523,489	565,897	243,187	10,901	190,434	31,209	106,532	60,030	825,676
Aug.	1,075,957	596,779	630,130	265,185	10,339	205,655	28,976	138,209	72,987	825,676
Sept.	990,139	563,477	579,444	259,649	10,253	202,914	23,681	119,689	64,411	805,301
Oct.	1,099,554	601,109	668,895	282,024	11,974	210,521	26,306	122,149	71,683	740,169
Nov.	940,138	482,732	599,292	242,847	10,601	166,552	24,302	91,138	58,754	704,623
Dec.	864,226	443,670	557,154	226,356	9,810	148,074	23,173	73,500	62,325	675,838
Total	12,664,504	6,876,497	7,786,229	3,310,915	.....	2,409,290	359,332	1,351,345	758,308	.....
1958										
Jan.	868,255	436,398	580,545	229,014	10,800	135,110	23,511	78,863	50,226	638,069
Feb.	753,306	389,708	503,175	203,717	10,245	116,168	25,959	67,606	40,398	632,490
Mar.	795,568	446,822	499,751	215,916	9,485	125,887	24,777	87,716	57,437	589,912
Apr.	806,720	457,498	483,999	210,344	8,015	121,489	25,401	112,292	63,539	582,446
May	820,054	472,192	469,026	203,025	5,671	134,312	23,498	123,017	70,201	570,293
June	867,948	541,904	503,252	245,651	5,773	135,477	22,928	129,671	76,620	572,706
6 mo.	4,911,851	2,744,522	3,039,748	1,307,667	49,989	768,443	146,074	599,165	358,241	.....

STEEL CASTINGS—SHIPMENTS (Net tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1956	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....
1957										
June	153,647	119,353	31,338	116,759	91,009	28,766	36,888	28,344	2,572	494,267
6 mo.	964,946	749,242	181,179	725,876	560,635	167,798	239,170	188,607	13,327	.....
July	122,018	90,037	22,803	91,730	67,719	21,426	30,288	22,318	1,377	489,390
Aug.	145,926	111,080	33,641	113,167	86,407	31,639	32,759	24,673	2,002	471,190
Sept.	139,002	105,611	29,718	106,261	80,871	27,885	32,741	24,740	1,863	438,510
Oct.	146,397	113,216	31,477	110,100	85,144	29,320	36,297	28,072	2,157	395,907
Nov.	127,115	98,436	26,892	93,343	71,846	25,105	33,772	26,590	1,787	362,948
Dec.	120,787	92,125	23,403	88,101	66,468	21,808	32,686	25,657	1,595	327,337
Total	1,766,191	1,359,747	349,659	1,328,478	1,019,090	324,951	437,713	340,657	24,108	.....
1958										
Jan.	120,722	94,717	22,545	87,525	68,203	21,115	33,197	26,514	1,430	304,907
Feb.	103,297	79,708	16,647	74,283	56,781	15,273	29,014	22,927	1,374	282,358
Mar.	106,233	82,195	16,180	77,564	60,208	15,240	28,669	21,987	940	252,840
Apr.	91,464	69,121	11,956	65,639	48,998	11,107	25,825	20,123	849	229,503
May	87,002	66,086	10,416	61,105	45,967	9,463	25,897	20,119	953	211,346
June	92,861	71,624	14,185	67,227	50,919	12,987	25,634	20,705	1,198	190,779
6 mo.	601,579	463,451	91,929	433,343	331,076	85,185	168,236	132,345	6,744	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.



COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1956	74,454,264	73,814,941	2,856,395
1957			
June	6,372,300	6,331,400	189,100
6 mo.	39,482,600	39,533,300	1,342,500
July	6,501,595	6,375,616	180,698
Aug.	6,519,973	6,401,949	206,907
Sept.	6,296,519	6,186,475	199,226
Oct.	6,275,567	6,120,485	208,720
Nov.	5,615,746	5,425,296	199,052
Dec.	5,164,965	5,099,556	173,470
Total	75,772,353	74,961,606	2,509,025
1958			
Jan.	4,762,050	4,643,022	192,098
Feb.	4,078,728	4,030,849	171,362
Mar.	4,343,326	4,208,343	168,194
Apr.	3,837,040	3,597,518	152,935
May	3,899,004	3,733,239	158,858
June	3,933,066	3,938,642	150,992
6 mo.[3]	24,852,822	24,151,221	994,319

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1957	1958
Jan.	25,681	20,468
Feb.	20,769	17,413
Mar.	21,948	18,825
Apr.	23,507	18,009
May	22,037	17,191
June	18,888	17,962
July	16,695	16,658
Aug.	19,654	.....
Sept.	19,670	.....
Oct.	22,800	.....
Nov.	19,767	.....
Dec.	16,875	.....
Total for year	248,291	.....

Source: Defense Council of the Ingot Brass and Bronze Industry.

ZINC-BASE ALLOYS

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1956	693,728	449,516	.....
1957			
June	49,356	33,206	64,137
6 mo.	347,038	223,045	.....
July	48,379	29,418	64,043
Aug.	49,829	34,040	64,789
Sept.	47,736	33,838	68,122
Oct.	62,332	39,990	69,275
Nov.	58,689	35,005	63,665
Dec.	49,597	29,998	58,792
Total	663,600	425,334	.....
1958			
Jan.	50,568	30,368	55,883
Feb.	42,687	27,482	50,676
Mar.	39,719	26,782	43,366
Apr.	35,796	23,830	27,634
May	36,447	24,588	33,438
June	38,132	25,993	34,888
6 mo.	243,349	159,043	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1957	1958
Jan.	117.9	57.9
Feb.	188.4	57.6
Mar.	127.0	85.9
Apr.	101.1	88.7
May	136.2	136.1
June	187.5	87.7
July	98.6	....
Aug.	231.3	....
Sept.	113.9	....
Oct.	145.3	....
Nov.	59.6	....
Dec.	61.4	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average.

Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

	All Scrap Total	By Types of Furnace: Cupola Total	Air Total	Electric Total
1956	71,709,489	9,817,287	1,133,128	9,862,887
1957				
June	5,430,607	744,790	80,063	705,590
6 mo.	35,963,629	4,885,279	558,830	4,965,213
July	4,897,752	652,773	68,504	629,395
Aug.	5,299,543	765,877	81,941	759,517
Sept.	5,033,998	721,125	82,948	672,597
Oct.	5,333,767	817,338	91,766	718,791
Nov.	4,858,489	716,095	72,871	589,879
Dec.	4,281,414	661,918	70,091	542,008
Total	65,688,592	9,220,405	1,026,951	8,876,400
1958				
Jan.	4,072,071	704,654	76,989	566,225
Feb.	3,491,441	611,394	64,971	466,657
Mar.	3,718,132	624,165	64,866	524,035
Apr.	3,429,121	599,427	61,839	531,220
May	3,862,491	596,253	59,060	553,756
June	4,409,006	615,271	62,703	605,733
6 mo.	22,982,262	3,751,164	390,428	3,247,626

PIG IRON PRODUCTION AND CONSUMPTION

	Production**—Net Tons: Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption*—Gross Tons: Total	Cupola	Air	Electric
1956	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	66,967,618	4,786,011	261,377	211,193
1957									
July	6,625,901	221,929	336,590	5,515,736	551,646	5,558,702	306,119	14,735	17,992
7 mo.	47,889,558	1,345,180	2,284,274	49,862,662	4,397,442	41,178,246	2,536,918	135,448	136,494
Aug.	6,719,763	228,378	298,269	5,451,691	741,425	5,769,995	349,988	17,540	25,948
Sept.	6,569,074	218,297	292,244	5,272,056	786,477	5,645,036	321,728	17,084	28,638
Oct.	6,454,450	164,944	303,104	5,390,851	595,551	5,669,624	354,364	18,466	24,691
Nov.	5,711,242	153,722	290,547	4,759,255	507,718	5,073,898	309,674	14,886	17,199
Dec.	5,212,624	165,268	228,897	4,394,869	423,590	4,565,635	288,219	14,754	13,881
Total[3]	78,557,011	2,275,789	3,697,335	65,131,684	7,452,203	67,902,434	4,160,891	218,178	246,851
1958									
Jan.	4,785,269	100,097	232,802	4,036,451	415,859	4,208,692	306,794	16,102	14,426
Feb.	4,016,276	106,921	193,429	3,396,382	319,094	3,551,679	260,940	14,014	7,740
Mar.	4,418,778	156,386	227,785	3,645,353	389,254	3,824,140	270,214	13,472	8,753
Apr.	3,787,907	136,180	173,139	3,053,634	424,954	3,378,893	262,007	13,975	9,585
May	4,048,328	127,438	165,045	3,359,836	396,009	3,691,550	256,204	12,001	11,764
June	4,396,285	121,869	167,192	3,764,607	342,617	4,058,714	262,883	12,098	15,549
July	4,277,515	123,075	156,582	3,595,008	402,850	.....	.....	.....	.....
7 mo.[3]	29,730,198	871,966	1,282,332	24,927,783	2,648,117	.....	.....	.....	.....

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only. [3]Monthly figures do not add up to totals shown because of unreported monthly revisions.

SAND AND FLOUR

- Domestic and Australian zircon foundry sands
- Zircon foundry flours in 200 and 400 mesh particle sizes
- Orefraction Zircon Sand and Flour meet S. F. S. A. specifications.

Orefraction
MINERALS INC.
ANDREWS, SOUTH CAROLINA

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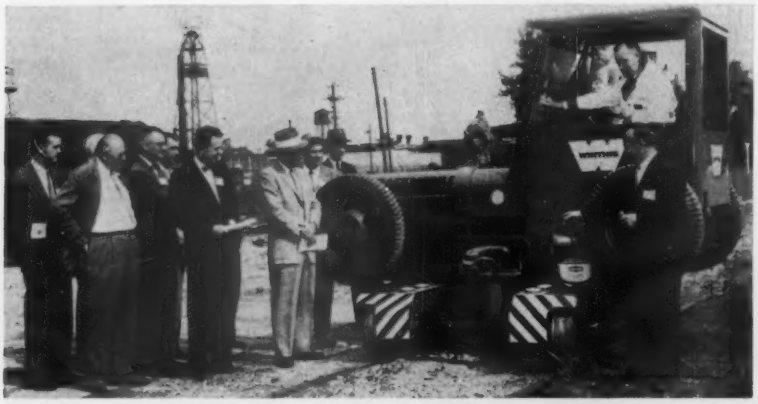
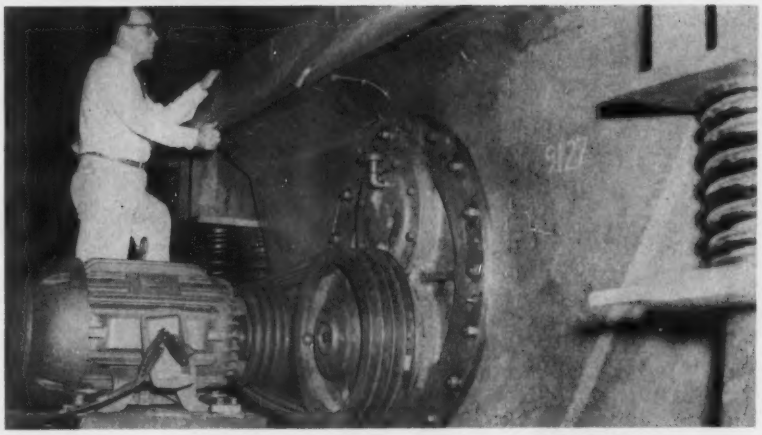
News Views



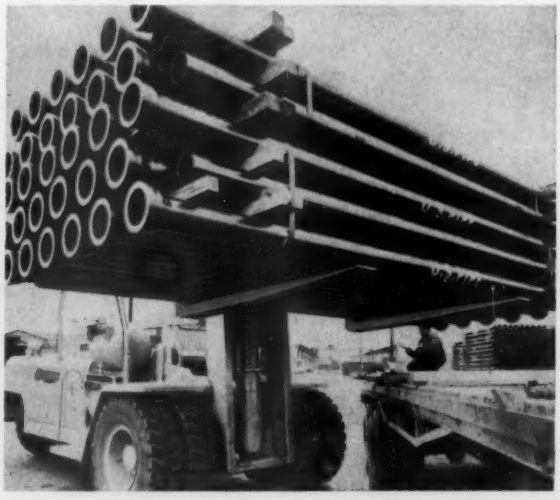
NEW MODEL: Distributors of the Whiting Trackmobile, the road-to-rail convertible that switches, spots, and hauls freight cars, were treated to an all-day demonstration recently in Harvey, Ill., of a new and improved model. The unit now features a torque converter for easier, smoother handling.

50-TON SHAKER: Designed for 50-ton core knockout duty, this shakeout is the largest ever built by Allis-Chalmers. It is a 10 x 12-ft, 100-ton flask mogul style unit and has been shipped to Erie Forge & Steel Corp., Erie, Pa. Deck is 3-in. cast steel, and support springs have a 150-ton capacity.



BIG BITE: Loaded weight of this dragline bucket—said to be the world's largest—will be nearly 88 tons. It was completed recently by Electric Steel Foundry Co. at Danville, Ill. Integrally cast drag chain weighs 90 lb per link, and the teeth weigh 177 lb each. Castings were made at Esco's Portland, Oreg., foundry.

PIPE LOADER: A full truckload of cast iron pipe is picked up at U. S. Pipe & Foundry Co., Birmingham, by a Gerlinger lift truck. The truck, which has a 20-ton load-carrying capacity, is equipped with 84-in. forks and side-shift carriage. It can also move half a railroad carload of packaged pipe in a single lift.



A TURN FOR THE BETTER will take

place in your plant when you use this compact TL-6 TRACTOLOADER* to transport materials. Practically turns on a dime — ideal for unloading boxcars and for moving bulk materials through narrow aisles and doorways. Turns from a 7½-ft aisle into a 6-ft doorway! Has power steering, a torque converter and a 15-cu ft tip-back bucket. Other TRACTOLOADERS up to 2 cu yd — 2 and 4-wheel drive. Sold and serviced by Allis-Chalmers dealers.

*TRACTOLOADER is a registered Tractomotive trademark.

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TRACTOMOTIVE CORPORATION, DEERFIELD, ILLINOIS

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☐ Please send TRACTOLOADER literature
☐ Have salesman call

Name.....

Title.....

Company.....

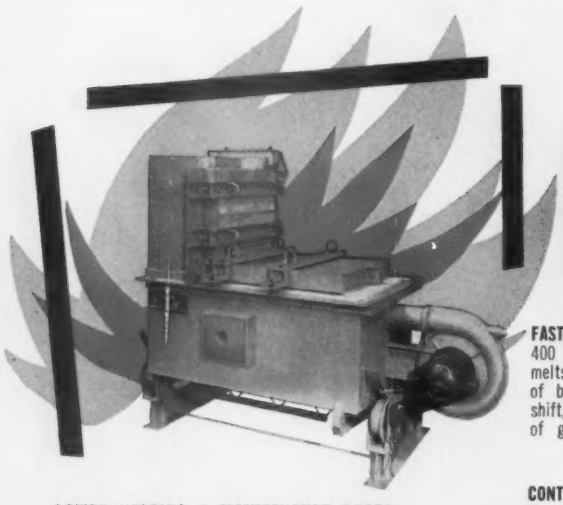
Address.....

City.....State.....

Circle 675 on Page 131

SAVE $ WITH REDA FURNACES

FUEL SAVINGS UP TO 50% REPORTED
USING REDA GAS-OIL FIRED FURNACES!



BEST HEAT EFFICIENCY

FASTER MELTING — One 400 series Reda Furnace melts up to 11,000 lbs. of brass or bronze per shift, and up to 6,000 lbs. of gray iron per shift.

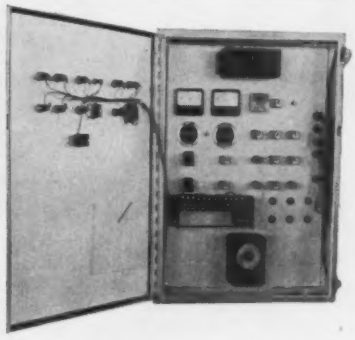
LOWER MELTING & MAINTENANCE COSTS— One man can operate a Reda Furnace . . . No daily repairs needed!

CONTINUOUS POURING— No waiting until floors, flasks, boards, etc. are filled with molds!

FURNACE DIVISION WRITE TODAY FOR DESCRIPTIVE BULLETIN
REDA PUMP COMPANY - BARTLESVILLE, OKLAHOMA

Circle 676 on Page 131

HARTLEY HYGRO-GUIDE SERIES XII $2995.00 COMPLETE



Here's Your Bargain Buy in FULL MIXING AUTOMATION!

Series XII Automatic Sand Moisture Control with Hartley Electric Time Guide operates any new or old batch type mixer—brings the accuracy, speed, economies and product improvement of automation within the reach of any foundry.

Single probe in mixer controls water as indicated by temperature and moisture of return sand. Can't double-batch! Other advantages include: Accessible and instant moisture adjustment . . . plug-in mounted relays . . . finger-tip mulling cycle regulator . . . cam operated timer with 12 stations.

Accurate—foolproof—easy to install and maintain—the Hartley Hygro-Guide Series XII comes complete in NEMA type 12, 30" x 42" x 8" cabinet, which may be located any distance from mixer.

Full particulars sent promptly on request.

HARTLEY Controls CORPORATION
Neenah • Wisconsin

Circle 677 on Page 131

Obituary

DANIEL J. JONES, manager of sales and service, New Jersey Silica Sand Co., Millville, N. J., died Aug. 15. He joined the sales department of the company in 1944 and became manager of sales and service in 1956. Mr. Jones was a director of the Metropolitan Chapter of the AFS and was active in work of the AFS Sand Division.

William J. During, 58, former president, Precision Castings Co., Syracuse, N. Y., died Aug. 22. Mr. During was active in development of the American Die Casting Institute and served as its president for 1954-55.

William D. Vanderbilt Jr., 46, assistant general manager, Cleveland Crane & Engineering Co., Cleveland, died Aug. 21.

Joseph J. Barsevsky, chairman of the board of directors, Electrocast Steel Foundry Co., Cicero, Ill., died Aug. 13.

Eugene Sykes, 77, president of Sykes Foundry & Machine Co., Burlington, N. C., died Sept. 3.

Northwest Foundrymen Plan Ninth Regional Conference

Ninth annual Northwest Regional Conference of the American Foundrymen's Society will be held at the Multnomah Hotel, Portland, Oreg., Oct. 31 and Nov. 1. The Oregon and Oregon State College Student Chapters will be hosts.

Program to be presented at the technical sessions is designed to cover modern trends in foundry practice. Friday's sessions will include discussions of plant layout, material handling, and work simplification. Panel sessions on Saturday will be devoted to molding methods and new coremaking processes.

Friday evening's banquet will have Bill Walkins, Electric Steel Foundry Co., Portland, as toastmaster. The conference will be concluded with a dinner dance Saturday evening.

F. M. Menzel, Rich Mfg. Co., Portland, is general chairman of the conference, with A. A. Belusko, Electric Steel Foundry Co., in charge of the program.

Cupola -tested
for Quality Performance
ABC FOUNDRY COKE

Control-testing of ABC foundry coke for carbon pick-up and melting temperature plays an important part in maintaining that consistent uniformity in quality for which it has long been recognized in the foundry trade.

ABC pioneered this method of pre-checking performance of its coke. Since 1944 it has operated a production size No. 2 Whiting cupola under supervision of its Research Department and service engineers. No laboratory tests can give comparable results in accurately determining coke quality and performance. Results of tests are kept by ABC and furnished customers on request.

Your inquiries are invited.

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Around the Country

NEWS REPORTS FROM

Chicago . . . Pittsburgh . . . Detroit . . . Philadelphia

Philadelphia— Foundry operations this fall have gotten off to a slow start. Gray iron job shops are averaging around 50 per cent of normal capacity, with backlogs ranging one to two weeks. Power transmission equipment requirements are holding up well and gray iron demand for food processing machinery and conveying equipment is moderately active. However, specifications for textile and papermaking equipment and machine tools lag badly, and auto die work is off from a month ago.

Most malleable shops are doing fairly well—better, in fact, on an average than other ferrous foundries. They are running at least four to five days a week. Business in pipe fittings and agricultural and electrical equipment is said to be holding up best.

Steel casting operations are still lagging. Industrial equipment requirements show little if any improvement over a month ago and delivery promises are easy. Except for special treatment castings, deliveries can be had in two to three weeks and in some cases sooner.

Independent bronze and brass shops are doing poorly, with operations estimated at no more than 40 per cent of normal. Captive shops are doing somewhat better on industrial pumps and valves, ship propellers, meters, and plumbing supplies. But in no case is there any overflow of such work and this situation is being felt by the independents. Various red metal shops are promising deliveries within three days. Aluminum foundries, on the other hand, are doing moderately well on parts for household durables and airplane needs. Nonferrous foundries in general are looking for more government buying in the near future.

Reduce Scrap Losses!

Cut corners on production costs! That, according to the experts, is what enables the non-ferrous foundry to compete even under today's conditions.

Make less scrap, for instance . . . refuse to waste profits on cold-shuts and misruns . . . check molten metal temperatures carefully and frequently!

That's the way the alert foundries are doing today, and Marshall Enclosed-Tip Thermocouples are helping them. With Marshall Theromcouples, the foundryman checks his metal temperatures quickly and accurately. He pours castings at right temperatures, thus reducing scrap losses and assuring a sound, quality output. Write for data. L. H. Marshall Co., 270 W. Lane Ave., Columbus 2, Ohio.

Marshall

ENCLOSED-TIP THERMOCOUPLES

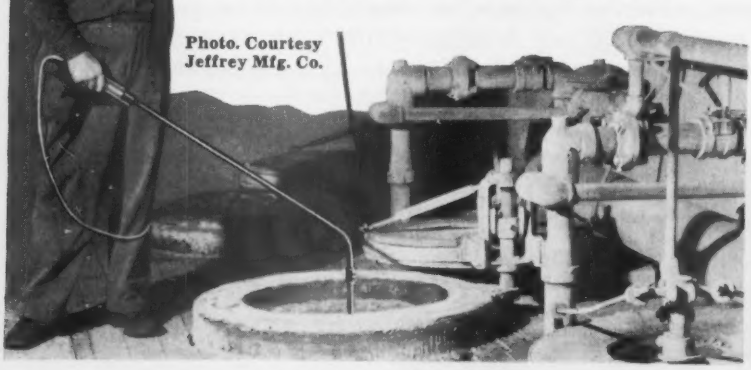


Photo. Courtesy Jeffrey Mfg. Co.

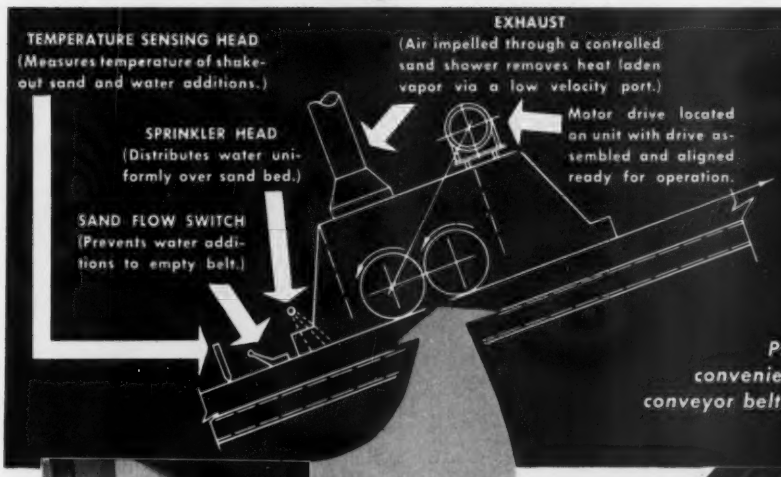
Chicago— Chicago's newest office building, the Borg-Warner Building, Michigan Blvd. and Adams St., was formally dedicated Aug. 21.

The 22 story structure, which cost $14 million, occupies the site of the famous Pullman Building erected in 1883. Borg-Warner Corp. has no share in ownership of the property but it is the principal tenant, occupying the top five floors and the roof suite.

A special feature of the building is the two-level industrial educational exhibit center opening off of the lobby and visual from the street on two sides of the building. The 6500-sq-ft area, known as the Borg-Warner Exhibition Hall, is claimed

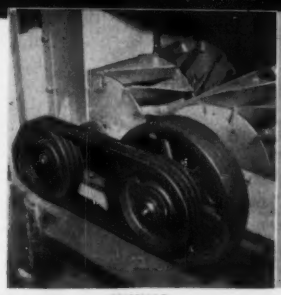
NOW!

YOU CAN ELIMINATE THE HOT SAND PROBLEM IN YOUR FOUNDRY—WITH THE PEKAY COOLERATOR WHICH WILL EFFECTIVELY COOL MORE SAND PER DOLLAR INVESTED


TEMPERATURE SENSING HEAD
(Measures temperature of shake-out sand and water additions.)
EXHAUST
(Air impelled through a controlled sand shower removes heat laden vapor via a low velocity port.)
SPRINKLER HEAD
(Distributes water uniformly over sand bed.)
Motor drive located on unit with drive assembled and aligned ready for operation.
SAND FLOW SWITCH
(Prevents water additions to empty belt.)

● INSTALL THIS ECONOMICAL AND HIGHLY EFFICIENT UNIT ON YOUR PRESENT RETURN SAND CONVEYOR BELT.

PEKAY COOLERATOR fits conveniently on flat or troughed conveyor belts, horizontal or inclined



MIXING
(Rapidly revolving cutter wheels break all lumps, thoroughly, aerate and distribute moisture throughout sand.)

The **PEKAY COOLERATOR** installation at **CLARK EQUIPMENT COMPANY'S** Steel Foundry, Buchanan, Michigan, cools return sand from a peak of 250° F to 115° F at the rate of 60 T. P. H.

BENEFICIAL FEATURES OF THE PEKAY COOLERATOR

- *Rapid sand cooling without retention time* • *Reduce mixing time in mill*
- *Insure closer sand quality control* • *Increase conveyor belt life*
- *Simplicity of installation* • *Low operating and maintenance cost*

CUSTOMER SATISFACTION GUARANTEED

PEKAY MACHINE & ENGINEERING CO. INC.

869 N. SANGAMON STREET CHICAGO 22, ILLINOIS

Specialists in foundry sand conditioning and handling, slurry systems, engineering and equipment

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COMPANY_____

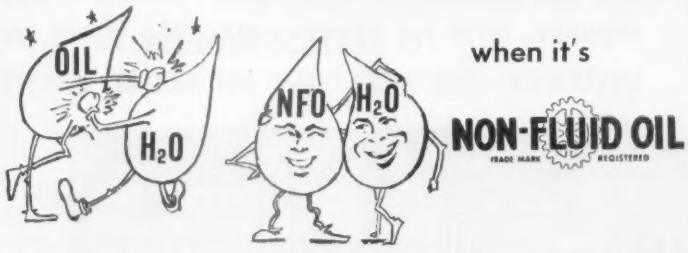
ADDRESS_____ CITY AND STATE_____

I would like information on:

- ☐ Pekay Mixer Mullers
- ☐ Pekay Coolerator
- ☐ Pekay Sand Systems
- ☐ Pekay Airators
- ☐ Pekay M-T-Matic Buckets
- ☐ Pekay Positive Mold Counters

Circle 680 on Page 131

Yes, oil and water DO mix



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TRADE MARK REGISTERED

Use of "NR" grades of NON-FLUID OIL has solved the problem of moisture content of compressed air in pneumatic tools. These superior lubricants absorb the moisture from compressed air into a complete emulsion, making the air part of the lubricating film. This means:

- Complete rust-proofing of air tools.
- Elimination of gumming of moving parts.
- Reduction of friction and increase of speed.
- More work production in same number of hours.
- Reduction of tool maintenance costs.

If you are not now using NON-FLUID OIL "NR" grades in your pneumatic tools, send for a free testing sample and bulletin 550.

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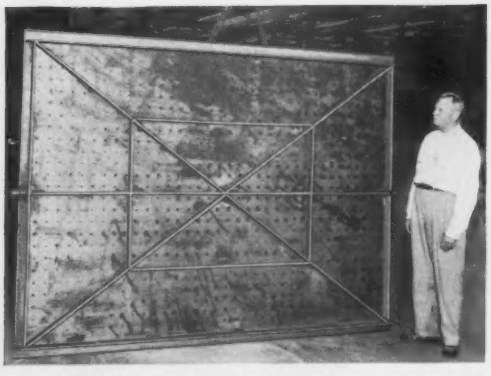
St. Louis, Mo.

Circle 681 on Page 131

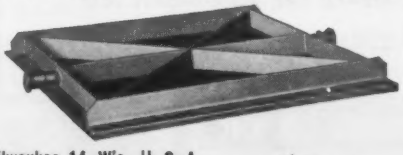
HERE'S "TOPS" in BOTTOM BOARDS



Mighty BIG is this Sterling-made Bottom Board, and mighty well engineered . . . as all Sterling Core Plates and Bottom Boards are . . . to prevent warping or twisting. All welded steel heavy reinforcing angles and bars assure maximum strength and rigidity. This big bottom board suggests the versatility of Sterling foundry equipment engineers. Another reason why Sterling is "TOPS" in this field.

STERLING MAKES THEM THE WAY YOU NEED THEM

Standard Core Plate and Bottom Board Styles are available in various sizes. Special designs, including round bottom boards, can be made to meet your needs. *Write for Catalog.*



STERLING NATIONAL INDUSTRIES, Inc., Milwaukee 14, Wis., U. S. A.
Founded 1904 as Sterling Wheelbarrow Company

Sterling
FOUNDRY EQUIPMENT

A-8143-½R

to be the first company-owned display center of its type in Chicago and one of the few in the country.

The Exhibition Hall shows the growth and diversification of Borg-Warner. The corporation's 40 divisions and subsidiaries manufacture over 200 different products.

Three of the company's divisions operate foundries. These are the Atkins Saw Div., Indianapolis, which makes hand and power saws and has an aluminum foundry; Ingersoll-Humphryes Div., Mansfield, O., which produces porcelain enameled cast iron and pressed steel bathtubs, sinks and lavatories; and the York Div. York, Pa., whose products include air conditioning, refrigerating, and heating systems. This also is a gray iron shop.

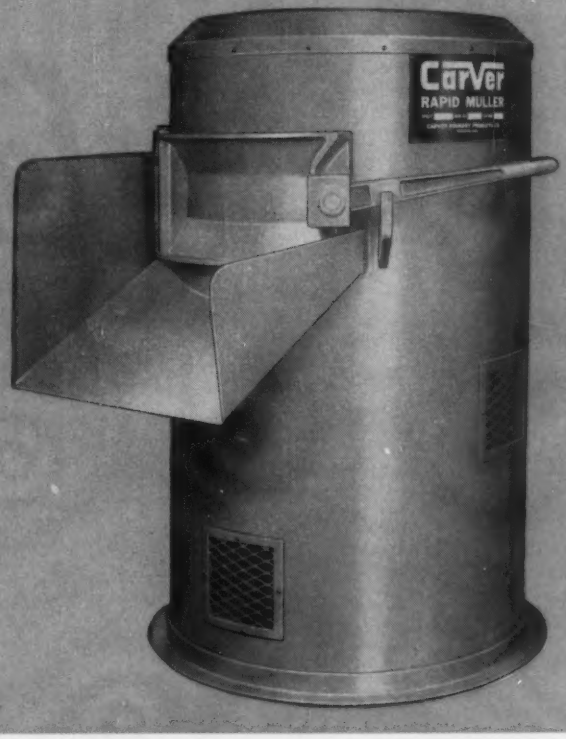
The Exhibition Hall has 18 colorful, striking exhibits to show the many Borg-Warner products and services. The exhibits, some of which are two stories high, have wide general interest and educational value. They demonstrate scientific, industrial, and home development as well as products.

Detroit—Much talk has been devoted recently to development work by several automotive companies on aluminum engines for passenger car use. Many in the automotive industry believe that such engines are near to production status. Brake drums, wheels, and other cast aluminum parts as well as components fabricated by other means may be expected to appear on early models, it is claimed. Numerous automotive parts, cast or otherwise, already have been converted to aluminum.

On Sept. 10 General Motors Corp. announced its Firebird III, third in a series of similar, experimental gas turbine-propelled cars. An outstanding and significant feature of the car is the incorporation of a two cylinder, 10 hp, four cycle, opposed piston, liquid cooled engine to power the car's accessories. Crankcase, cylinders, and heads are cast in one piece. Properties of the alloy are said to eliminate the need for cylinder liners or wear-resistant coatings. This latter feature overcomes a major obstacle in automotive aluminum piston engine development.

Two of the principal reasons why automotive companies are interested in aluminum for functional automobile parts are light weight and easy machinability. Ultimate cost savings are inherent in both factors. But some force had to create sufficient interest in aluminum to overcome the natural inertia of any

NEW CarVer RAPID MULLER



Patented, self-cleaning mixing arm, with replaceable, wear-resistant NiHard end pieces.

FAST! A BATCH EVERY 76 SECONDS!

Not only does this revolutionary new machine mix core sand *fast* . . . the mulling action is so thorough that you *save up to 30% in binder!* Each grain of sand receives an equal coating of binder, so that the finished mix is absolutely free from lumps or wet spots!

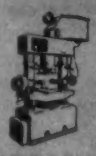
No more cleaning or maintenance problems! The new Carver Rapid Muller mixing arm does most of the cleaning itself. And it's easy to reach inside and clean, without awkward wheels and paddles to get in the way. Maintenance? There is only *one* moving part . . . *eliminating wear and costly repairs.* You can *rely* on the Carver Rapid Muller because of its *extreme simplicity* in design. Takes up only 7 square feet of floor space — *the most compact muller on the market!*

Most important, your initial investment in the Carver Rapid Muller is *two or three times lower* than most other makes!

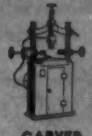
COMPARE CARVER WITH ANY OTHER MULLER -- RIGHT IN YOUR OWN FOUNDRY! Carver will place its Rapid Muller alongside *any* other muller and let its performance speak for itself. *You be the judge* — and let the best muller win!

WRITE OR CALL TODAY FOR COMPLETE DETAILS

Only CarVer Has Everything For the CO_2 Process!



CARVER V & S Core Shooters



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KRAUSS Core Vents

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Circle 683 on Page 131

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Slag-Resistant Plastic Refractory

NARCOLINE Assures Cleaner Castings

It successfully resists the erosive and corrosive action of metals and slags, eliminating refractory inclusions from the casting.

NARCOLINE Facilitates Metal Flow

It resists graphite burnout under operating conditions, and maintains a lasting lubricated surface for easy metal flow.

NARCOLINE Assures Easy Slag Removal

It resists the wetting action of molten metal and slag, permitting ladles to be cleaned of solidified metal and slag with little effort.

NARCOLINE Easy to Install

It can be rammed to any desired shape with mallet or air hammer. Requires no special training to install.

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NORTH AMERICAN REFRACTORIES, LTD.
191 Victoria Ave., South, Hamilton Ontario

Circle 684 on Page 131

organization to continue using metals for which they had extensive production facilities.

That force was the aluminum producers, who for years have sponsored engineering research and development programs to expand the use of that light metal. Results of those programs repeatedly are presented to potential customers. The producers also offer their facilities, talent, and money for cooperative development programs.

Pittsburgh— Although sales and operations remain sluggish, foundrymen report that inquiries are picking up quite noticeably. Barring an automotive strike, they expect their fourth quarter shipments to be the best of the year.

"The volume of our new business hasn't increased," says a foundry supplier, "but customers seem interested in our products. We're getting a lot of inquiries from agricultural implement manufacturers. They've had a pretty good year, so they're thinking about modernizing their foundries."

U. S. Steel Corp.'s decision to relight open hearths at its Edgar Thomson Works was good news for foundries that supply rolls and castings to the steelmakers. As mill operations improve, demand for replacement parts increases.

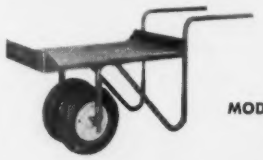
"August was our first good month this year," a roll manufacturer reports. "We're working five days a week, two turns a day. In our iron foundry, the backlog is four to six weeks; in steel, two or three weeks."

Although it has received some "live inquiries" for castings used in heavy electrical equipment, a foundry that normally employs more than 200 workers has "no backlog to speak of." Operating at less than half of its capacity, it has recalled only a half-dozen workers it furloughed earlier this year. "When we went on vacation during the first two weeks of August, we didn't know what we were going to do when we came back," says a sales manager. "We're operating our iron foundry five days a week, but on an intermittent schedule. The steel foundry's working three, four, and five days a week."

Gray iron foundries think they've seen the worst of the recession, but few expect recovery to be rapid. One shop reports that its backlog would last about a month at capacity operations. "We're trying to stretch the work out," it explains. Price cutting is still a problem, but fewer foundries are resorting to the practice.

CMD

A COMPLETE LINE OF CORE HANDLING EQUIPMENT



MODEL C-1

MODEL A-27

You can count on CMD for the finest in core handling and allied foundry equipment. Our core trucks, barrows and racks are built to handle and transfer cores safely and easily. The secret is CMD's exclusive resiliency—a resiliency caused by coil, leaf spring and pneumatic cushioning—the smoothest core ride in the industry.

Look to CMD for superior quality, longer life, less maintenance in foundry products.

- CORE BARROWS
- CORE TRUCKS
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- SLIP JACKETS

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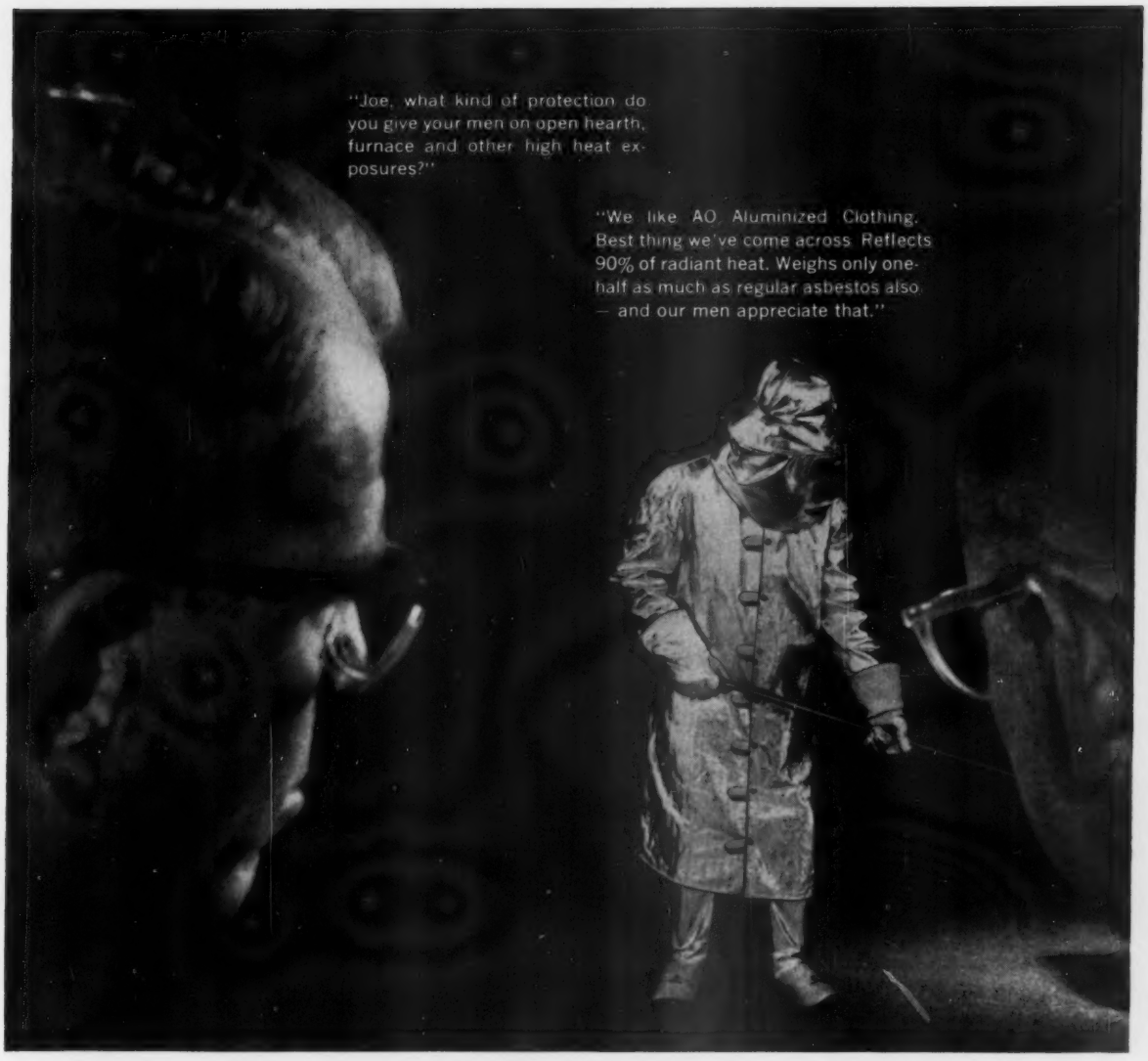
Circle 685 on Page 131


"Joe, what kind of protection do you give your men on open hearth, furnace and other high heat exposures?"
"We like AO Aluminized Clothing. Best thing we've come across. Reflects 90% of radiant heat. Weighs only one-half as much as regular asbestos also — and our men appreciate that."

HIGH HEAT PROBLEMS?

Take a Tip from These Safety Directors!

Yes and AO Aluminized Clothing is a very serviceable material. It's flexible and will not peel or crack under normal conditions. Aluminized *asbestos* protects against molten metal splash — Aluminized *duck* is recommended only for protection against radiant heat. The line is complete — from hoods to foot protection including gloves and mittens.

All garments are equipped with reflective metal fasteners, anchored through double thicknesses of material. Leather pull tabs on coats for quick release. Wool collars. All seams are double stitched. Plenty of room for freedom of motion.

Aluminized Asbestos is lightweight herringbone asbestos — Aluminized Duck is flameproofed 10 oz. cotton duck.

AO Aluminized *Asbestos* is recommended for electric furnace tapping, metal pouring, molten glass and similar exposures as well as open hearth and blast furnace operations. Your nearest American Optical Safety Products Representative can supply you.

Always Insist On AO Trademarked Safety Products

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SOUTHBRIDGE, MASS.
Safety Service Centers in Principal Cities

1833—1958 • 125 LEADERSHIP YEARS

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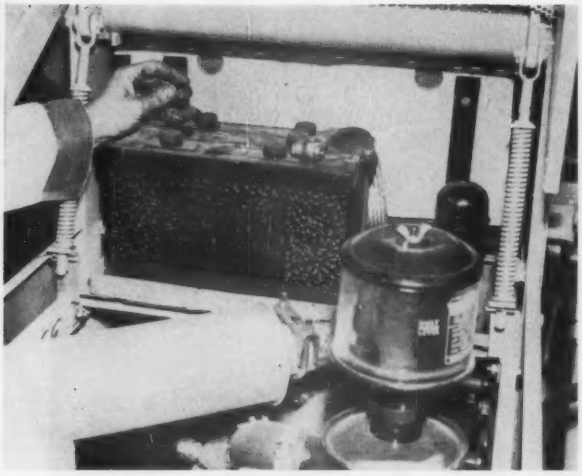
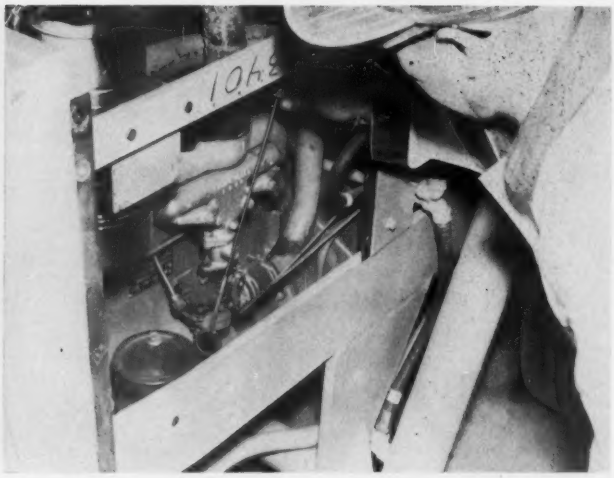


Battery fluid level should be checked every 8 hours



Crankcase oil should be replaced every 50 hours

Preventive Maintenance Lengthens

TRACTOR SHOVEL LIFE

By **ALVIN E. YORK**
Manager, Service Department
Construction Machinery Division
Clark Equipment Co., Benton Harbor, Mich.

TRACTOR shovels do a lot of jobs around foundries, jobs like hauling molding sand, lugging castings, unloading materials, towing carts and wagons, and carrying heavy tools and machine parts. They can do these jobs even better if they are cared for properly.

Dollars-and-cents logic shows clearly that the cheapest way to get the most out of these rugged machines is to give them the same care any craftsman gives fine tools. It costs money to make sure that the machine will keep doing a top-notch job, but maintenance costs only a fraction of the money it saves.

Most foundry mechanics carry out the most obvious maintenance operations from time to time. They check to see that the radiator doesn't get clogged with dust and dirt, and they try to keep the crankcase oil level up to where it belongs.

But the man responsible for plant operations should be sure that each vehicle operator and maintenance man knows what to look for, where to find it, and when to carry out servicing operations. A checklist based on manufacturer suggestions and individual field operations is the easiest way to have the job done right.

Daily Check — Daily inspection should be made either before or after each eight-hour shift. In general, it's best to run the daily check at the end of the shift so that any extra work required can be done before the machine is needed again. For gas or diesel units with torque converters, these points should be covered:

Check Engine Oil Level — Add manufacturer-specified oil to keep the level at the full mark. The machine should be parked fairly level with the engine turned off when the check is made.

Clean and Refill Oil-Bath Air Cleaner—Tremendous amounts of dust and grit are drawn into the

Pre-air cleaner needs regular check for presence of foreign materials

To Better Serve the Mid-West

AT East Moline, Illinois, in the heart of the Quad-Cities, comes a new plant and office for Tousey Varnish Co. offering closer contact and service to the many new manufacturing areas west of the Mississippi.

Tousey engineers and designers have planned this new plant to be one of almost complete automation—from storage tanks and bins through the mixing process to the end product all is handled automatically and without interruption. Complete shipping facilities allow a choice of truck or rail delivery. With this latest type equipment installed throughout, the production in this compact 20,000 sq. ft. plant can exceed 1,000,000 gallons of paint per year.

For more than 70 years Tousey has been supplying weather resistant paints, varnishes, sealers, lacquers and synthetics to agricultural and industrial manufacturers all over the country. With this new addition at East Moline, Ill., Tousey hopes to better service their many customers in the Mid-West.

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TOUSEY VARNISH CO.

520 W. 25th Street, Chicago 16, Illinois, Victory 2-2201

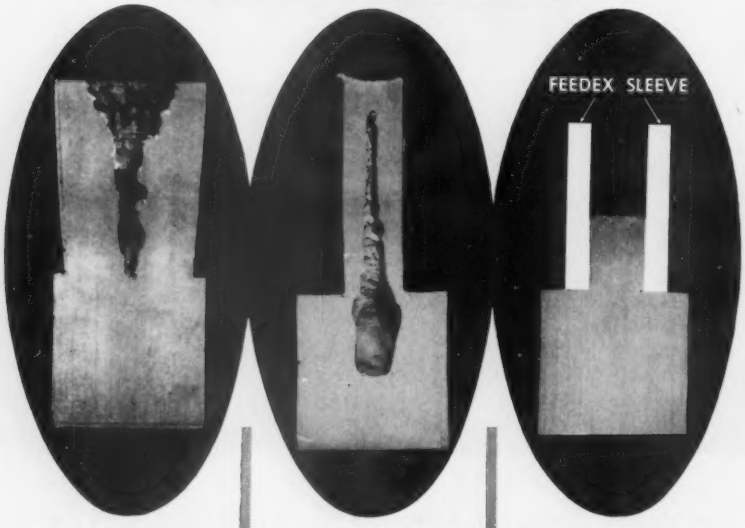
2500 8th Avenue, East Moline, Illinois, Phone 35295

Circle 687 on Page 131

• Eliminate Shrinkage
• Increase Casting Yield
with
Foseco® FEEDEX®

. . . for all steel, iron, light and non-ferrous alloys

THIS IS FEEDEX EFFICIENCY



Casting produced using a normal riser without Feedex.

Casting produced using a reduced riser without Feedex.

Casting produced using a reduced riser and Feedex sleeve. (Note sound casting, savings to be made in metal and cleaning costs.)

Factory-tested Feedex offers you these advantages —

- eliminates shrinkage
- reduces cleaning costs
- reduces scrap
- can be molded to any shape
- aids directional solidification
- keeps feed metal molten longer
- permits reduction in riser size — more castings from each heat
- does not alter properties of the metal

Prefabricated Feedex Sleeves are available in a wide range of sizes and can also be supplied to your own special requirements.

FOUNDRY SERVICES, INC.

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Send this coupon for free leaflet giving all the facts about how you can increase feeding efficiency with FEEDEX.

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unit during a day's work. Dirt can ruin rings, pistons, and con rod bearings if the air cleaner is full of sludge. Clogged air cleaners also increase fuel consumption and lower power output.

Check Radiator Water or Antifreeze—This precaution can prevent damage resulting from overheated engines and torque converters. (In some units, the radiator also cools the torque converter.) Use water with a low mineral content and add a corrosion inhibitor.

Add Fuel—Simple as it is, this operation sometimes is forgotten, and a machine runs out of gas on the job. Gasoline of 75 octane minimum or No. 2 diesel fuel should be used. Fuel cans and drums should be free of scale and dirt.

Check Transmission and Torque Converter Oil Level—Add manufacturer-specified transmission oil if required. These components share a common oil supply.

Check Hydraulic Oil Supply — The machine should be level and the bucket on the ground during the check. Use only high quality, heavy duty hydraulic fluid.

Check Battery Liquid Level — Only water with low mineral content (preferably distilled water) should be used. Battery terminals should be checked for tightness, and any corrosion wiped off. A light coating of grease helps to prevent corrosion of terminals.

Daily maintenance also should include a quick visual inspection of the machine to note obvious conditions requiring correction. Operation of lights and other electrical equipment should be checked, too.

Fifty-Hour Inspection — Maintenance required at 50-hour intervals requires more time than the brief daily inspection, but probably is the most important operation in prevention of abnormal wear. These components should be inspected:

Crankcase—Drain and refill with the lubricant specified by the manufacturer. The machine should be level and the oil should be hot (hot oil carries out more sludge). *Never* flush with kerosine; it provides insufficient lubrication.

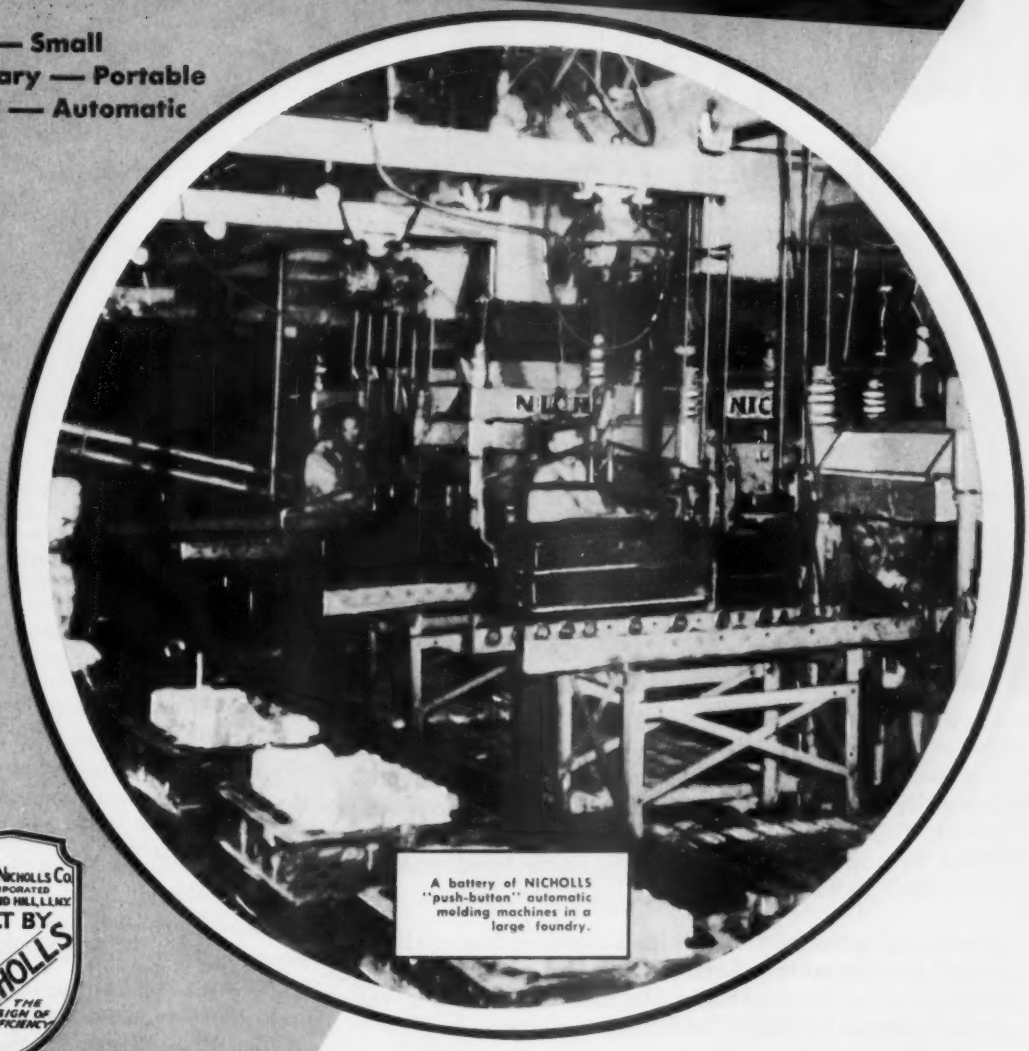
Engine Oil Filter—Remove the sludged filter and replace it with a new one. Always use new gaskets, and run the engine a few minutes after filter installation to make sure there are no oil leaks.

Differentials—Both front and rear differentials should be checked for the proper amounts of lubricant;

NICHOLLS MOLDING MACHINES

QUALITY MOLDS...in quantity...with economy

Large — Small
Stationary — Portable
Manual — Automatic



A battery of NICHOLLS "push-button" automatic molding machines in a large foundry.

WM. H. NICHOLLS CO. INCORPORATED RICHMOND HILL, L.I.N.Y. BUILT BY NICHOLLS THE SIGN OF EFFICIENCY

Behind the hand of American industry for half a century

You get consistent high quality molds, continuous mold production, cost-saving molding efficiency with a Nicholls Molding Machine. They are precision engineered to eliminate dangerous risks, costly mistakes . . . give you better molds at lower costs. Whatever your requirements, write, wire or phone NOW for complete information, specifications and prices.

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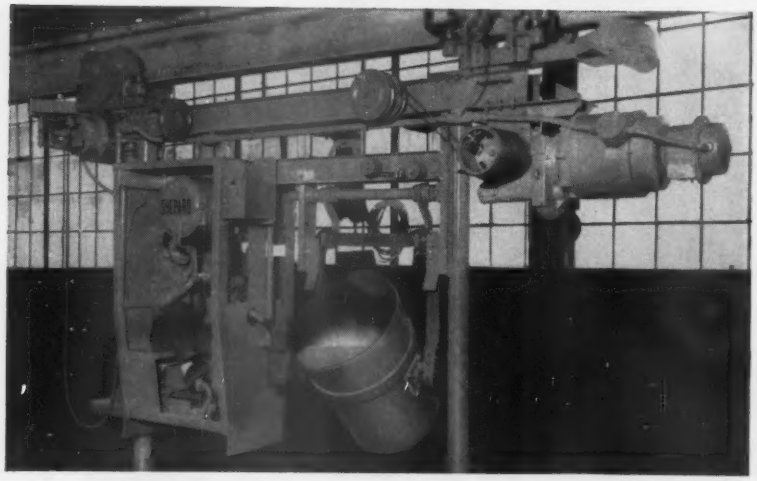
SHEPARD NILES

HOT METAL CARRIER

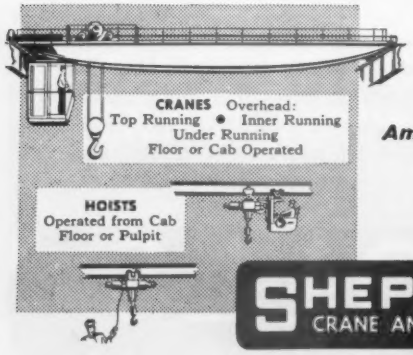
MOVE HOT METAL

the safe, swift, economical way



Shepard Niles hot metal carriers efficiently move molten metal safely and swiftly from cupola to pouring line. These rugged, modern carriers cut handling costs and save manpower by enabling ONE man to transport and pour molten metal. You can be certain of fast precision pouring because the operator cab is on the same level as the hot metal being poured.

Mechanize your foundry for labor-saving, low cost handling of molten metal. Send for the Hot Metal Carrier bulletin . . . or ask that a Shepard Niles representative call — there's NO OBLIGATION.



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America's Most Complete Line of Cranes and Hoists Since 1903

SHEPARD NILES
CRANE AND HOIST CORPORATION

1382 Schuyler Ave., Montour Falls, N. Y.

add SAE 90 extreme pressure gear lube if required.

Planetary Gears—Rotate the rear wheels until the filler plug is at the top and the check plug slightly below the center of the hub. Remove the plugs with the proper wrench.

Master Brake Cylinder — Add only heavy duty hydraulic fluid. It's wise to check the air vent and remove any accumulated dirt.

Steering Gear Housing — Check the level and add only SAE 90 straight mineral oil.

Generator—Add a few drops of SAE 10W oil to cups. This time also is a good one to run a visual check of brush and commutator condition.

Oil Separator Tank—Check the oil level and add more if needed, following the manufacturer's recommendations.

Other Periodic Maintenance—Additional maintenance should be carried out at longer intervals. Most convenient intervals usually are 500, 1000, and 2000 hours, but requirements vary with field conditions. A good general rule is that signs of abnormal wear or heavy dirt accumulation mean that the check should be made more often.

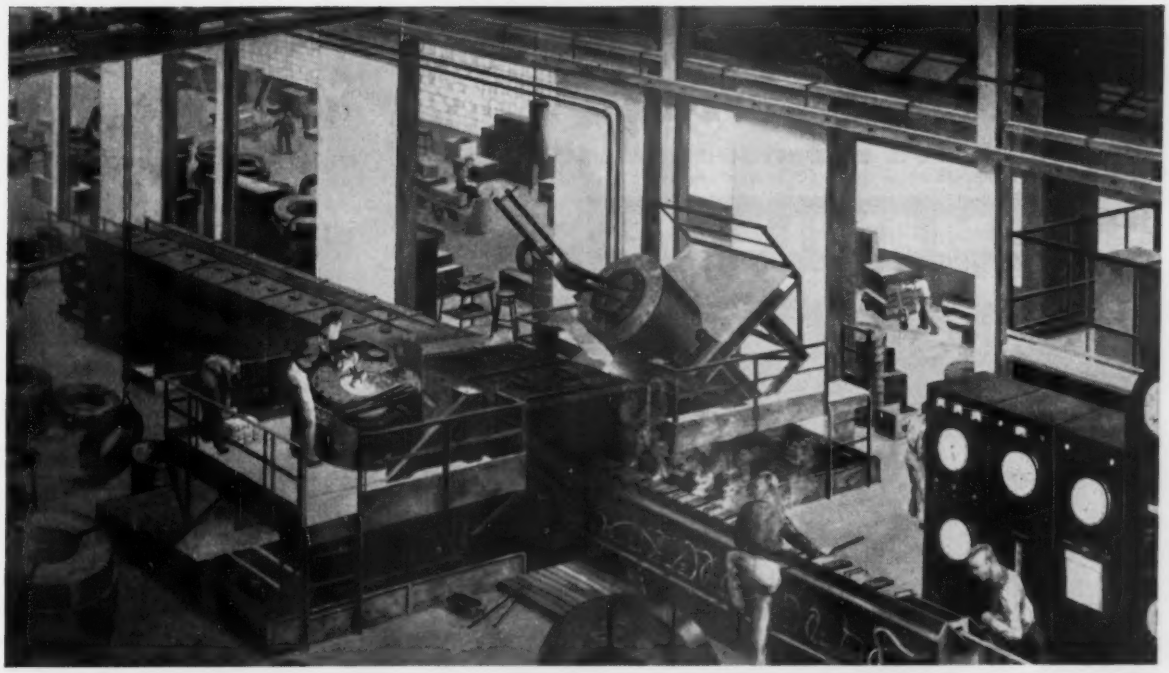
The 500-hour check should include these operations:

Lubricate Propeller Shafts and Universal Joints—Use a low-pressure hand gun to avoid blowing the seals and apply grease to the fittings sparingly. An old instruction worth repeating is "Clean the grease fitting first." Whatever goes into the fitting comes out on machined surfaces, and a mechanic who pumps accumulated dirt through the fitting is asking for trouble.

Drain and Refill Torque Converter—The unit should be drained hot if possible. The transmission sump should be removed and swabbed clean, and the sump screen should be cleaned. It is important to use new gaskets in replacing the sump to avoid leakage.

Remove and Replace Torque Converter Filter — Replacing this filter periodically is extremely important in avoiding major repairs. A filter costs a few dollars, but it can avert the need for a transmission overhaul. After the filter has been replaced and the torque converter filled with oil, the machine should be run a few minutes at a fast idle and the oil level re-checked. Usually it is necessary to add a small amount of oil.

Clean Fuel Filters—Filters on



60 CYCLE INDUCTION MELTING OF HIGH LEADED BRONZES

15 years ago, THE CLEVELAND GRAPHITE BRONZE COMPANY, division of CLEVITE CORPORATION, pioneered 60 CYCLE INDUCTION MELTING of bronzes with up to 35% lead. Special furnaces developed by AJAX for this difficult job are an important element in their unique continuous production line for steel-backed bronze bearing strip. 60 CYCLE INDUCTION MELTING furnaces resulted in substantial improvements and cost savings over gas-fired units used earlier for that purpose. Today, CLEVITE operates six continuous lines in this country and abroad with AJAX 60 CYCLE INDUCTION MELTING furnaces, producing enough strip to make 130 million bearings and bushings per year.

The heavy duty 60 cycle inductor developed by AJAX and pioneered by CLEVITE will attain a lining life of one year with bronzes of substantial lead content. Electromagnetic stirring assures uniform alloy and close temperature control. Compared to externally fired equipment, metal loss savings run into many thousands of dollars per year. Recently, several large producers of leaded bronze castings converted their foundries entirely to 60 CYCLE INDUCTION MELTING.

While this is one of the most difficult metals to handle, the advantages of 60 CYCLE INDUCTION MELTING stand out today wherever copper alloys are melted. As specialists in 60 CYCLE INDUCTION MELTING, we have developed furnace types to best fill each application.

We invite you to discuss your melting problems with us at the NATIONAL METAL SHOW, CLEVELAND, Oct. 27-31, BOOTH 1608

AJAX USA

ENGINEERING CORPORATION

TRENTON 7, NEW JERSEY

60 CYCLE INDUCTION MELTING

Associated Companies: Ajax Electrothermic Corporation Ajax Electric Company

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A COMPLETE LINE OF
ROLLER CONVEYERS
engineered and standardized by
MATHEWS

Roller conveyer pouring lines served by two roller conveyer transfer cars in modern mechanized foundry.

The Mathews line of roller conveyer is complete, with rollers ranging from 1-¾" to 6-½" in diameter, and with capacities from 60 lbs. to 13,000 lbs. High quality ball bearings are used throughout.

Accessories such as turntables, hinges and switches are available from stock.

A full line of couplings and supports makes the installation of Mathews Roller Conveyer lines convenient and easy.

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MATHEWS
(Member Foundry Equipment Manufacturers Association)

gasoline models should be cleaned and replaced. Both primary and secondary fuel system filters on diesels should be replaced with new cartridges.

Drain Oil Separator Tank — The tank should be drained and refilled with the proper grade of hydraulic fluid.

At 1000-hour intervals, front and rear wheel hubs and differentials should be drained and refilled with SAE 90 extreme pressure gear lube. The hydraulic mechanism also should be lubricated.

The oil separator tank should be removed at 2000 hours and it and its lines flushed with gasoline. The boom and bucket hydraulic system also should be drained and refilled at 2000 hours—or more often in extremely dusty operation. This care avoids abnormal wear of cylinders, pistons, and packing.

Avoid Postponing Repairs

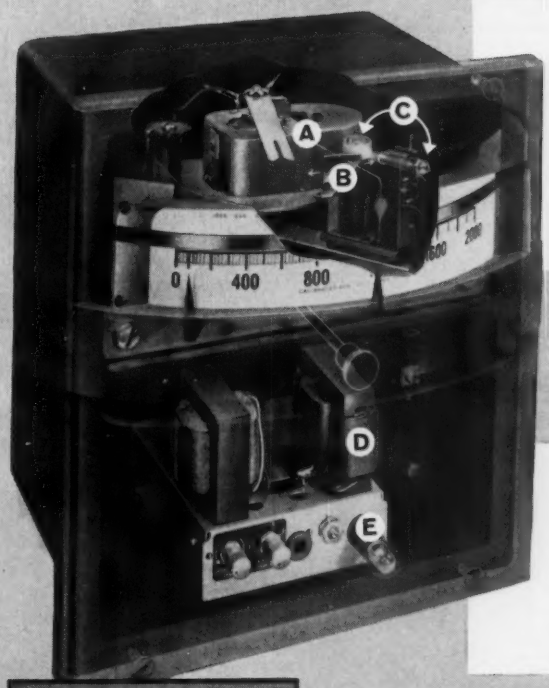
Several maintenance operations should be carried out at intervals that are best determined by experience. The same basic principle of all preventive maintenance applies: Fix it as soon as it needs it; nothing is gained by postponing a simple job.

It is surprising how often counterweights have fallen off only because no one ever thought to put a wrench to the bolts. Axle tie-down bolts and engine mounting bolts also are loosened by vibration over a long period of time. Hydraulic lines to bucket and boom cylinders should be checked for abrasion occasionally.

Fan belt tension needs occasional adjustment. The air cleaner screen should be rinsed in solvent when it appears to be quite dirty. The rubber hose between the air filter and manifold should be checked for abrasive damage and leakage.

Inspection of the bucket stops is important but simple. After years of use, the stops sometimes wear down, allowing the piston to advance too far and damage the cylinder head. Whenever work is done on the hydraulic system, the bucket should be on the ground or on a rigid support to prevent injury to mechanics if a hose should give way or someone accidentally should touch the controls.

In establishing any preventive maintenance program, remember that owners' manuals contain most of the information you need. Factory men have put much thought into the manuals, and they should be used.



MEASURING UNIT

A. A thermocouple signal to a d'Arsonval galvanometer, the only moving part, moves the indicating pointer up scale.

B. Aluminum vane adjusts the amount of light received by the photocell from the operating lamp.

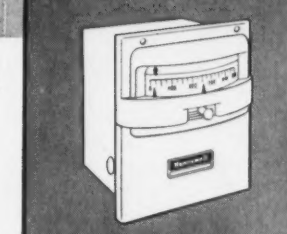
C. If operating lamp or photocell fails, output voltage assumes a value equal to high temperature.

***Pyr-O-Volt* has built-in voltage regulator to maintain voltage within ± 1% of level required for maximum operating stability. Spare operating lamp supplied. Thermocouple burnout protection optional. Available in horizontal and vertical case.**

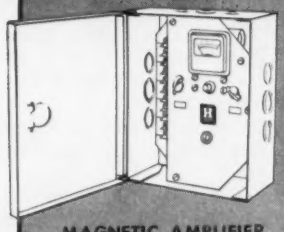
CONTROL UNIT

D. A one-stage magnetic amplifier amplifies small current from the photocell in the measuring unit. This is the only active electronic element in the controller.

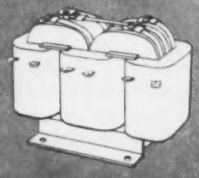
E. Pilot light goes out on line power failure.



MILLIVOLTMETER CONTROLLER



MAGNETIC AMPLIFIER



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For your electric heating applications . . .

Use this accurate, dependable *Pyr-O-Volt** controller

- **No tubes to wear out**
- **Voltage regulation**
- **Fail-safe design**
- **Contactless, stepless control**

Here's an accurate instrument for reliable stepless control of saturable reactors, r.f. generators and other power amplifiers. It has a proportional band adjustable from 2/3% to 5%, and a manual reset adjustment which shifts the control point over 100% of the proportional band.

The *Pyr-O-Volt* controller can control saturable core reactors up to 100 kva, if used with a Brown magnetic amplifier. You can also use this proportional output millivoltmeter-controller with the General Electric *Reactrol***, and with the Westinghouse *Furnatron*.*** Complete packaged systems available.

Contact your nearby Honeywell field engineer for complete details. He's as near as your phone.

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Honeywell

*Tradename, Minneapolis-Honeywell Regulator Co.
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***Tradename, Westinghouse Electric Corp.

H HONEYWELL

First in Control

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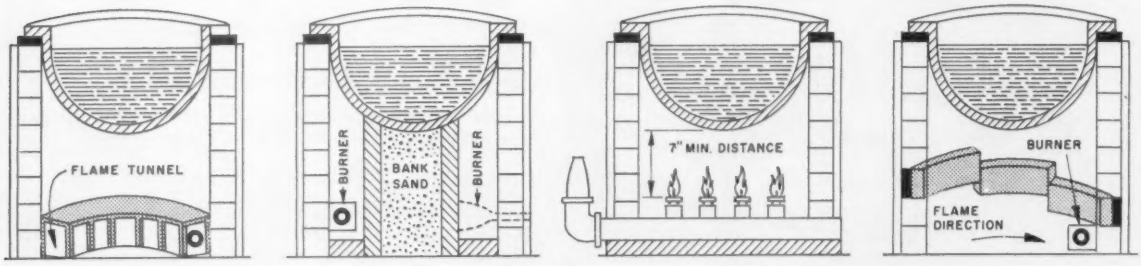
Trouble Shooting

By C. W. AMMEN



Four basic arrangements for pot furnaces

Melting Pot Life

Dear Charlie:

Several months ago, we purchased an aluminum melting pot, took the cover off of a little-used stationary brass furnace, cut a flue near the top at the back and put in the kettle. All went well for a short time, then the pot cracked (of course, it was chock full when it let go). The No. 2 pot did not crack but wore through in no time. No. 3, a plain old unalloyed gray iron pot, lasted a mite longer.

Either we have to get $5 a pound for the castings or find out what gives with kettle melting of aluminum.

Sincerely,
Sam

Dear Sam:

The life of a pot, or its behavior under the best of practice and knowhow, at times would tax the wisdom of King Solomon.

Under the conditions and rig you apparently are using, however, I would say you have attacked the problem of needing a bit of extra melting capacity like many a true-blue, hard-headed foundryman I know, being of the same breed.

You know what I mean; stick the pot in and let her rip. If it works, fine; if not, then fight it a bit. I don't mean to be sarcastic, having been the party of the first part on many a bang-up job like your dumping a kettle in an old brass rig.

I know a gent with one of the finest foundry reference libraries going, and darned if he won't go out in the shop and shovel a big load of grasshoppers into the heap, or some other earthshaking trick, until he is in deep trouble. Then he will dash back and refer to his data to find out what it was he did wrong. See what I mean?

Before I get too deep into what little light I may be able to shed on your problem, I wish to mention here that aluminum also is melted to a large extent in graphite or silicon-carbide crucibles.

Many pot manufacturers do not build or sell furnace equipment, but I am sure they are well acquainted with the problems and their solution, as are the furnace manufacturers. I would contact them.

Illustrated here are roughly the various basic arrangements for pot type furnaces.

As to pot life, I am of the school which believes that a pot made of alloyed iron produced by a firm in that business is by far your best bet. It should be fired in a commercially built furnace designed for that purpose, and thereby you have the combined experience of both, leaving you to direct your time to the business of making castings.

Barring a bum pot, life is affected by operational and installation faults, or a combination of the two.

The prime installation faults are these:

1. Flue too large and improperly located.
2. Flame impingement caused by improper burner positions, uneven furnace wall, or incorrect shape.
3. Combustion chamber too small.
4. Uneven heat.

The prime operational faults are these:

1. Not rotating pots on a one or two burner furnace.
2. Improper mixture of fuel and air, resulting in a cutting flame.
3. Reducing the fuel in a greater proportion than air when holding or pouring metal.
4. Improper loading of the pot.
5. Applying heat too quickly to a cold pot.
6. Overheating the metal.

Most foundrymen are inclined to build equipment. It is much wiser, however, to devote your efforts (if you must build something) to rigging which would improve your operation. Many foundries devote very little time to preventive maintenance of existing equipment, only to find themselves faced with a shop full of wornout, broken, and inoperative equipment.

Ever been in a shop like that?

Sincerely,
Charlie

...and rest assured!

You can lean back and relax when Standard's famous BLACKHAWK foundry sand is working for you. That's because you know you are using the finest silica you can possibly buy; that your foundry products will be top quality; that they will require less finishing, less clean-up time.

BLACKHAWK is the name, and the Standard distributor in your area is the man who can supply you.

Shipping facilities via two of the nation's trunk line railroads.

STANDARD
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OTTAWA • ILLINOIS

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Circle 693 on Page 131

YALE outperforms any loader—handles 25% more material every hour...Field tests prove it!

EXTRA WORK PER HOUR. No matter what bulk you handle, you'll get more productive work at less cost with the new Yale Industrial Tractor Shovel. *It carries more*—full 2500-lb. bucket capacity. *It moves faster*—accelerates to operating speed of 8 mph in 3.5 seconds—to 13 mph in 5.5 seconds. Exclusive Yale Torque Transmission (fully automatic) permits quicker, smoother starting, eliminates shifting, provides more power under load conditions—speeds cycle operations. Gasoline or LP-Gas.

EXTRA SAFETY. Yale's exclusive Safety-Curve Arms assure extra-safe elbow room—extra visibility when bucket is raised.

EXTRA MANEUVERABILITY. This is the first tractor shovel designed especially for *industrial* use. It's *compact*—only 117" overall length—can maneuver in any aisle wide enough for a wheelbarrow.

EXTRA LOADING AND DUMPING FEATURES. Yale's exclusive 45° ground-level tipback insures the ultimate in loading action—and a grade-level carrying position to minimize spillage. Exclusive 6' dumping clearance is the highest on any model of similar wheelbase. Bucket is automatically self-locating—lowers from full dump-position to ground-level. Bucket automatically returns to digging position.

For a demonstration in your plant or for actual case histories, write to The Yale & Towne Manufacturing Co., Philadelphia, Pa., Dept. 3410.

COMPARE!

For only 3¢ more per hour* the Yale Industrial Tractor Shovel offers these exclusive features

- Exclusive Yale Torque Transmission (fully automatic)
- Exclusive 45° ground-level bucket tipback
- Exclusive Safety-Curve Arms
- Exclusive accelerating speed of 8 mph in 3.5 sec.
- Exclusive sealed brakes
- Exclusive forward and rear operating lights
- Exclusive 6' dumping clearance

*Based on comparative initial costs depreciated over 10,000 working hours.

YALE* *REG. U.S. PAT. OFF.

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TIME SAVERS IN ANALYSIS OF SPELTER

Methods Are Outlined for Major Elements

By **CHARLES GOLDBERG**
Chemist
New England Smelting Works Inc.
West Springfield, Mass.

SOME time-saving procedures in the chemical analysis of spelter are presented here in the belief they will be helpful to other analysts.

Tin, copper, lead, iron, aluminum, and cadmium are the elements usually determined in spelter. Tin, as a rule, is done gravimetrically or the precipitate of metastannic acid is redissolved in sulfuric acid and the tin determined volumetrically. Copper and lead are assayed electrolytically. Iron is now almost always measured colorimetrically. Aluminum and cadmium may be determined gravimetrically, but other methods are available.

Volumetric Method—Our experience indicates that the hypophosphite-iodine volumetric method for tin, originally designed for brass and bronze analysis, may be equally well applied to spelter analyses. It is rapid, avoids any filtration, and is as accurate or more accurate than a gravimetric determination;

Dissolve a 1-gram sample in a 500-ml flask by adding first 20 ml c.p. concentrated hydrochloric acid, then, slowly, 30 ml of 30 per cent hydrogen peroxide solution. When the strong reaction has stopped add 80 ml of 37.5 per cent hydrochloric acid containing 3 per cent mercuric chloride. Add 3-4 grams of sodium hypophosphite. Bring the solution to a gentle boil and continue the heating until the solution clears (less than 5 minutes). Insert a vertical air trap in the mouth of the flask and fill the trap with a solution of saturated sodium bicarbonate.

Cool the assembly to approximately 10° C and remove the air trap. Add a few small marble chips or a little sodium carbonate solution, 5 ml of 100 per cent ammonium thiocyanate solution and starch indicator. Titrate immediately with standard iodine solution. An iodine solution that will have a tin factor of approximately 0.05 per cent tin per ml consists of 0.3 gram c.p. potassium iodate and 2.9 grams c.p. potassium iodide in a liter of water.

Copper and Lead — The electrolytic method for the determination of copper and lead is commonly used. There seem to be few advantages to various other volumetric and colorimetric methods that have been proposed. We use the unfiltered solution to save time; with the amounts of tin usually present in spelter there is no adherence of metastannic acid precipitate to the electrodes.

Transfer a 1-gram sample to a 150-ml beaker and dissolve with 10 ml 50 per cent nitric acid solution. Heat to drive off nitrous oxide fumes and dilute with water to 125 ml. Electrolyze at 6 amps and 3 volts for 15 minutes, with stirring. Add 1 ml 50 per cent sulfuric acid solution, 5 ml 10 per cent sulfamic acid solution, and two drops of 1 per cent hydrochloric acid. Electrolyze for an additional 15 minutes. With the current on, lower the beaker and immediately bring a beaker of distilled water up over the electrodes. Turn off the current and dip the electrodes in alcohol or an alcohol-acetone solution. Dry the electrodes in an oven and weigh. The empirical factor for lead is 0.864.

Iron Determination—Iron is easily determined colorimetrically. It is both more rapid and more accurate than determining iron gravimetrically as the oxide. Dilute the

Japanese Castings Production Statistics

Production figures in metric tons

	Gray Iron	Malleable Iron	Steel	Copper Alloy	Light Alloy	Total
1953	938,844	47,184	173,123	32,871	12,150	1,204,172
1954	962,415	55,483	160,485	34,906	12,119	1,225,408
1955	924,650	58,200	144,390	35,803	11,627	1,174,670
1956	1,241,523	73,402	209,723	48,445	15,255	1,588,348
1957	1,435,190	90,148	275,488	59,344	20,276	1,880,446
Number of Foundries .	2,241	84	149	929	354	3,757

This table was included in a compilation of Japanese castings industry statistics published recently by Kubota Seisakusho Ltd., Nagoya, Japan. Production figures are in metric tons. A metric ton equals 2205 lb.

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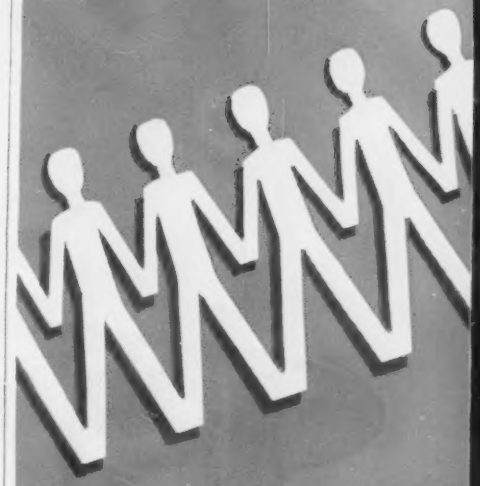

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O. K. Mac; so why should I help young men toward a foundry education? What's in it for me?

All right, sir we'll give it to you straight: You may never see the young men you help today. But, you are part of the foundry business, and we assume that anything that helps the foundry business helps you.

Shop experience and good old practical know-how may have been good enough for yesterday's foundry, but things have changed. The cast metals industry needs trained engineers to help raise the quality of castings, improve production efficiency and broaden sales.

As you may have noticed, foundry engineering talent is scarce. With your help, we want to correct this situation. We want to encourage bright young men to study all phases of foundry engineering. They will form a pool of potential foundry experts. When you need trained engineering brains, you simply dip into the pool that you helped to create.

Write for our booklet "Lets Look Ahead."

Foundry Educational Foundation

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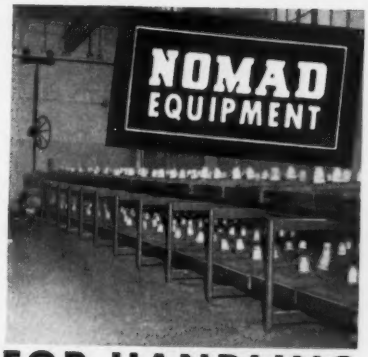

FOR HANDLING SHELL MOLDS

Nomad Conveyors are designed and built to meet the requirements of shell molding operations. This Double Level Track Conveyor saves valuable floor space and has elevators at each end for fast shell handling.

RAPID POURING!

The operator elevates the shells to an easy pouring height. After pouring he elevates the shells and rolls the wheeled pan pallets onto the upper track. In this foundry pouring is completed in one and one-half hours!

Nomad Elevators cycle rapidly and feature shock-free performance.

In this view the Elevator is set to allow shells to be forked out easily. Notice the large amount of space around the Conveyor and Elevator. (Paper cups protect gates from dirt.)

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Write today NOMAD EQUIPMENT

NOMAD EQUIPMENT DIVISION
WESTOVER CORPORATION
3110 W. FOND DU LAC AVE.
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Circle 697 on Page 131

solution remaining after the copper and lead electrolysis to exactly 250 ml and mix well. The volume of the tin precipitate is ignored. Filter an aliquot of 10 ml through a No. 42 Whatman or equivalent paper into a 250-ml volumetric flask. Wash the precipitate on the filter paper once with a warm 1 per cent nitric acid solution. Add to the filtrate ten drops of concentrated hydrochloric acid and ten drops of 3 per cent hydrogen peroxide. Add 25 ml of 10 per cent ammonium thiocyanate solution, swirl, and dilute to the mark with water. Mix well and allow to stand 5 minutes. Measure the color transmittancy at 525 millimicrons and refer the scale reading to a standard iron curve.

Measurement of Aluminum — Aluminum often is determined gravimetrically in zinc alloys, but the method is tedious and errors due to zinc absorption in the precipitate or coprecipitation of iron are always possible. We prefer the "aluminon" colorimetric method:

Transfer a 1-gram sample to a small beaker. Add 5 ml of 50 per cent hydrochloric acid. Cover and warm, then add a few drops of 30 per cent hydrogen peroxide. Warm the solution until it has evaporated to approximately 2 ml. Cool, and transfer to a 1-liter flask. Dilute to the mark with water and mix. Transfer 25 ml of the solution to a 100-ml volumetric flask. Add 2 ml of 4 per cent thioglycolic acid solution (freshly prepared). Add 15 ml of buffer solution made as follows: 125 grams of ammonium acetate are dissolved in 250 ml distilled water and 20 ml of concentrated acetic acid. Filter if necessary into a 500-ml volumetric flask. Dissolve 0.25 gram of the ammonium salt of "aluminon" in 50 ml of water and filter into the same flask. Dissolve 0.5 gram benzoic acid in 20 ml of methanol and add to the flask in small portions, with shaking. Dilute the solution to 500 ml and transfer it to a 1-liter flask. Add 240 ml glycerin and dilute to the mark with water. Store in amber.

Place the 100-ml flask in boiling water and allow to remain there 4 minutes. Cool, and dilute the solution to the mark with water. Stopper and mix. After several minutes read the color transmittancy at 525 millimicrons. Use as a blank the reagents employed, treated exactly as outlined above. Refer the scale reading to a standard aluminum curve.

Cadmium Analysis Difficult—The accurate assay of cadmium in spelter is difficult by the classical sulfide

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Circle 698 on Page 131

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Blast Metal Away with ARCAIR

Here's metal removal to beat anything you've ever seen before! Arcair Torch cuts, gouges, grooves, bevels or flushes off *any* metal . . . does it faster, cheaper, through a revolutionary combination of the electric arc and ordinary compressed air.

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WRITE TODAY FOR COMPLETE INFORMATION!

Arcair Metal Removal Torches

465 S. Mt. Pleasant St., Lancaster, Ohio

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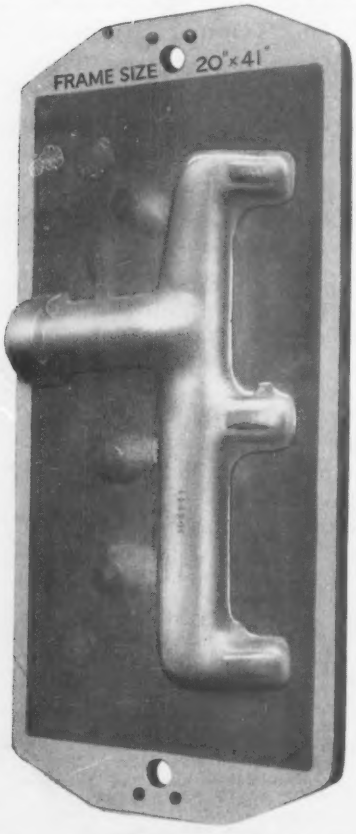

"The type of work we produce in TAMASTONE we would be unable to make at all in the absence of skilled help"

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This Drier pattern for a diesel intake manifold is made from an original master pattern. *Only one skrinkage!* Pattern was used for 500 pieces. Only 3½ hours labor and 50 pounds of TAMASTONE were required. Up to 1,000 castings have been made from a plate of this type!

No special skill needed to increase production 400% or more! . . . WRITE . . .

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precipitation method because of the necessity of freeing a small quantity of cadmium from a large amount of zinc. Two and often three reprecipitations must be made. Drying the precipitate may result in some oxidation of the cadmium sulfide. Volumetric methods are available in which the sulfide precipitate is redissolved and titrated but the procedure remains time-consuming and great care must be exercized to secure good results. We prefer the gravimetric thiourea-Reinecke salt method, as applicable to small amounts of cadmium as to large. There is a clean-cut separation of cadmium from zinc in one filtration and the unpleasant hydrogen sulfide odors are avoided.

Dissolve a 1-gram sample with 10 ml of 50 per cent nitric acid, heat to remove nitrous oxide gas, and filter the tin through a No. 42 Whatman or equivalent filter paper. Wash twice with warm 1 per cent nitric acid. Discard the precipitate and paper. Electrolyze as under copper and lead above. Transfer the remaining solution (free of copper and lead) to a 500-ml flask and add 20 ml of 50 per cent sulfuric acid. Take to white fumes of sulfur trioxide. Cool. Dilute with 350 ml of water. Add 3.5 grams of thiourea. Add 10 ml of a filtered, saturated solution of Reinecke salt (ammonium tetrathiocyanodiammonochromate) containing 1 per cent thiourea. The supernatant liquid should be strongly pink.

Stand the flask in running, cold water, with occasional swirling, for 45 minutes. Filter through a weighed Gooch crucible and wash once with a cold 2 per cent thiourea solution, then three times with ethanol. Dry the crucible at 110°-120° C for one hour (90 minutes if the cadmium content is 5 per cent or more). The cadmium factor has a low, favorable ratio—0.1247. There are few interferences. Bismuth interferes seriously. If antimony is present, add a little tartrate. The filtered Reinecke salt solution should be less than a week old.

If cadmium determinations in spelter must be made frequently, some time is saved by titrating the precipitate. Wash the ppt. twice with cold water and redissolve it with 5 ml of hot 5 per cent sodium hydroxide solution. Wash twice with hot water. Add concentrated hydrochloric acid to the solution to 4-5 normal. Add 10 ml thiophene-free benzene. Titrate with 0.1 normal potassium iodate solution. The end-point is the decolorization of the benzene upon shaking.

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NEW MANHATTAN SAFETY BACK FLARED CUP

Not simply a new safety "feature" . . . not merely a design "improvement." Here's a *totally new concept* of flared cup wheel design *and* construction . . . developed by Manhattan engineers to give the greatest safety and performance advantages possible for flared cup wheel users. Manhattan's revolutionary SAFETY BACK Flared Cup puts portable wheel *safety* where it counts the most—in *original* strength and breakage resistance!

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Only SAFETY BACK gives you these features—*plus* Manhattan's custom-engineered abrasive bond for *faster* removal of *more* metal on your particular job—at no additional cost! For "More Use per Dollar" in portable grinding operations, you can't get a faster cutting, longer lasting—*safer* wheel than MANHATTAN.

Let a Manhattan abrasive wheel engineer show you the advantages of SAFETY BACK Flared Cups, and other types of Manhattan high speed, heavy duty abrasive wheels. Write for Bulletin 7157.

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Circle 701 on Page 131

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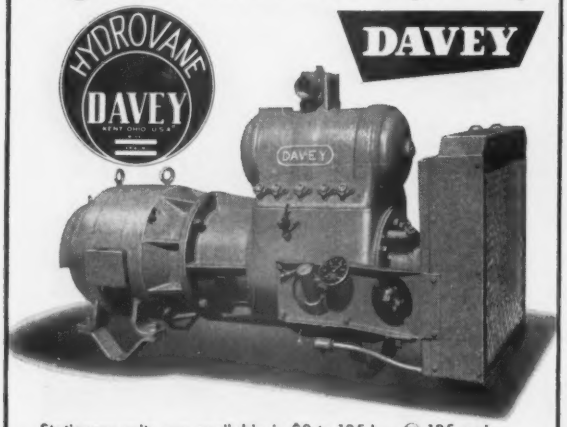

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Here is the only really modern compressor being offered to industry. Compactness, longer life, lower operating costs and lower initial costs are just a few of the advantages . . . Don't buy before you have the full story of what a Davey unit can do for you. Write or phone today for Bulletin M-132! AA-6952

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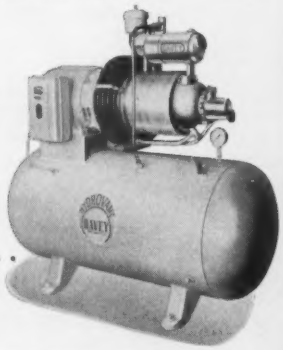

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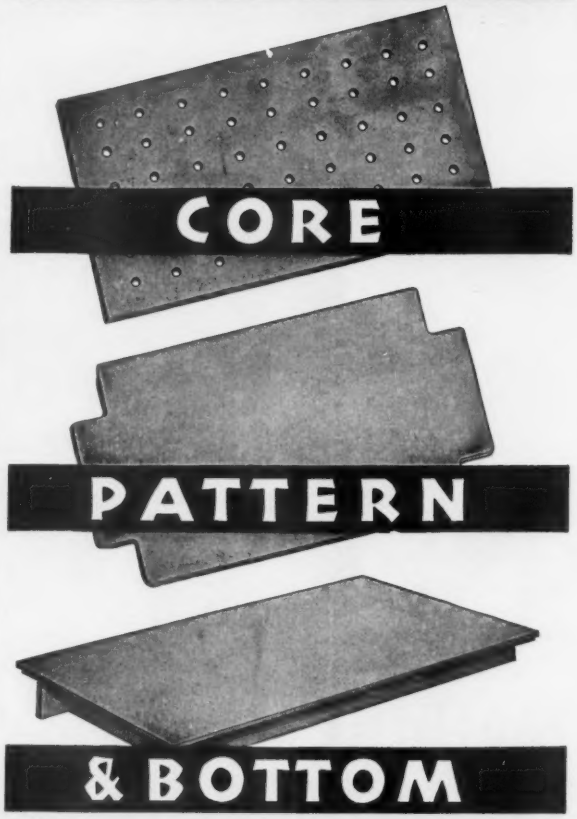
Kent, Ohio

MOLTRUP



CORE

PATTERN

& BOTTOM

PLATES

for accurate casting results specify Moltrup Plates! They *stay flat* and *last longer* than other types—for Moltrup employs a special flattening process designed to permanently eliminate buckling or bending.

Consequently your investment goes further and that *all-important profit-margin* increases. Plates are made to your specifications—we welcome the opportunity to furnish complete information.

MOLTRUP STEEL PRODUCTS COMPANY

BEAVER FALLS, PA. (Pittsburgh District)

Sales Offices in All Principal Cities

MOLTRUP

Circle 703 on Page 131

Circle 704 on Page 131

for efficient
desulphurization
at low cost...
Diamond
Foundry
Grade
ASH

Diamond Alkali's dust-free, coarse particle Soda Ash will give you greater efficiency and economy in your desulphurization operations. Diamond's years of experience as one of America's largest producers of soda ash are at your service. Call your nearby Diamond Sales office, or write Diamond Alkali Company, 300 Union Commerce Bldg., Cleveland 14, Ohio.

DIAMOND PRODUCTS FOR THE FOUNDRY

■ MOROC® (Controlled Silicate CO_2 binder) —Foundry Grade Ash—Chlorine—Caustic Soda—Solvents.

Diamond Alkali Company, Cleveland 14, Ohio

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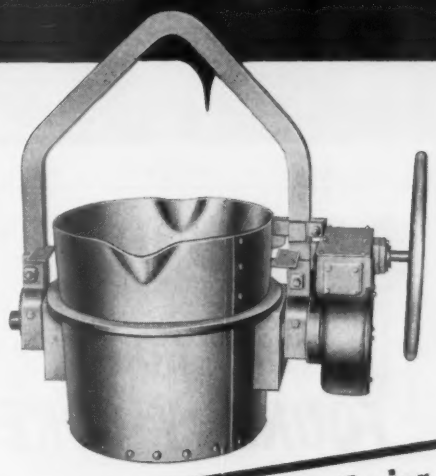
Diamond Chemicals

Circle 716 on Page 131

JOB ENGINEERED for Greater Pouring Efficiency



Pour More Metal Per Day Easier—Safer—With Less Man Power

Regardless of the ladle equipment you may need—standard or custom—Industrial makes them both, and both are "Job Engineered" to offer you these advantages:

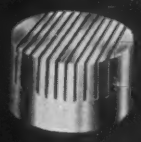
- Ease of operation—Greater Safety
- Elimination of heat distortion and binding
- Elimination of gear wear from binding
- Rugged, heavy duty construction for longer, more profitable service
- Easier maintenance

Industrial Equipment Co. manufactures a complete line of standard and custom pouring and handling equipment—Bowls . . . Shanks . . . Bails . . . Tongs. Write today for latest catalog.

Industrial
EQUIPMENT COMPANY
115 OHIO ST., MINSTER, OHIO

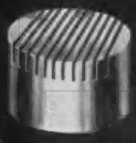
Circle 717 on Page 131

SLOTTED CORE BOX VENTS



X-TRA DEEP HEAD .156 Wide Slots .014

SHALLOW HEAD .031 Wide or Narrow Slots .014 .010



DEEP HEAD .093 Wide or Narrow Slots .014 .010

CO_2 TYPE DEEP HEAD .093 Wide or Narrow .014 Slots .010

Manufactured by **C. M. SMILLIE & CO.** 1124 WOODWARD HGTS., FERNDALE 20, MICH.

INSERTING DRILL

- MOST ECONOMICAL METHOD for INSERTING CORE VENTS
- CORRECT DEPTH
- UNIFORMITY OF HOLES
- FASTER INSERTION OF VENT

VENT CLEANER

- FOR CLEANING SLOTS
- MADE OF TEMPERED STEEL
- EASY TO USE

Circle 705 on Page 131

EMPIRE*

"THAT GOOD" FOUNDRY COKE

DEBARDELEBEN COAL CORPORATION

2201 First Ave., North • Birmingham 3, Ala.

Phone: ALpine 1-9135

*Reg. U.S. Pat. Off.

Circle 706 on Page 131

SAVE $5,000 TO $10,000 A YEAR!

Send for "Case History." Tells how a Typical Gray Iron Foundry with floors for 20 molders saved $8,300.00 in a year on sand preparation with a Self-Propelled, Self-Loading,

RINGLIFT SAND CONDITIONER

No obligation. No solicitation unless requested.

STATES ENGINEERING CORPORATION
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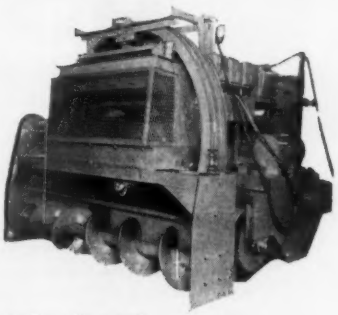
Fort Wayne, Indiana



Circle 707 on Page 131

PENN BUCKETS

Careful balancing makes Penn Buckets self dumping when loaded and self righting when empty. Welded construction prevents "clinging" makes them empty easily and completely.

WRITE TODAY FOR NEW BULLETIN AND DIMENSION SHEET

No. 4-A Self-Dumping

PENN IRON WORKS, INC.
READING, PENNA.

Circle 740 on Page 131

OLIVER Double Arbor Saw

Bench rips, crosscuts, miters patterns quickly

Adjusted in a jiffy to each operation . . . saves time and cuts costs

This double-duty Saw Bench saves pattern shops valuable time. Shaftless motor is built directly on each of two saw arbors. Either rip or crosscut saw can be brought into action by turning handwheel. Saw arbor tilts up to 45°. Arbors adjustable vertically. Rips up to 24¼" wide, crosscuts up to 36" wide. A 16-inch saw projects 3¼" through table. Dadoes up to 4" wide. Cuts perfect miter. Has most complete and accurate set of gauges. Write for Bulletin No. 260D.

Oliver makes a full line of fine Saw Benches, Pattern Lathes and other woodworking machines for pattern shops. Write for full details.

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

Circle 741 on Page 131

CENTRIFUGALLY CAST

AUTOMOBILE CYLINDER LINERS

DIESEL ENGINE LINERS

BRONZE BUSHINGS

on the new WATER-COOLED Model M-WC
(Illustrated)

Utilizes low cost permanent molds of available steel tubing to produce gray machinable cast iron or bronze bushings. Water cooled molds can be maintained at either high or low temperature easily. High or limited production in very small space with unskilled labor. Completely safe for workmen. Simple, sturdy equipment. Quick changeover from one mold to another. Practically 100% metal yield of high quality, denser castings. Metal porosity eliminated.

Write for New Bulletin #257 Illustrating Model M-WC

RESEARCH FACILITIES

We have available an Experimental Foundry equipped for ferrous and non-ferrous melting for both vertical and horizontal centrifugal casting production. Our facilities are available to foundries for research or trial centrifugal castings at low cost.

Centrifugal Casting Machine Co.

P. O. Box 947 Tulsa 1, Okla.

Circle 708 on Page 131

MURPHY PISTOL SPRAYER
Forces blackening into pores and pockets of molds. Sprays Silica wash, oil, or water equally well. Use it also to sand blast or as a blow gun.
Standard of the foundry field for over 50 years. Stocked by leading foundry supply houses. Guaranteed by . . .
2673
JAMCO
JAS. A. MURPHY & CO., INC.
1425 EAST HIGH STREET, HAMILTON, OHIO

Circle 709 on Page 131

FOUNDRY

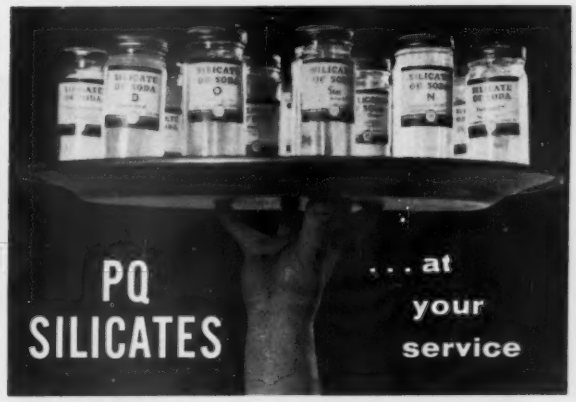
EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

MECHANIZATION

Circle 710 on Page 131



Whatever your foundry use for sodium silicate is, the right one for you is found in the PQ line. This covers 40 products (liquids, solids, hydrated and anhydrous powders), $2Na_2O:SiO_2$ to $Na_2O:3.75SiO_2$.

Maintaining quality control in your operations is easier. Both raw materials and finished silicates are carefully checked so that dependable quality is uniform, shipment after shipment.

PQ silicates have been made for a century. Helpful data on silicates and their uses are available in PQ bulletins. Request information on your silicate use.

PHILADELPHIA QUARTZ COMPANY
1062 Public Ledger Building, Philadelphia 6, Pa.

PQ SOLUBLE SILICATES

9 PLANTS • DISTRIBUTORS IN OVER 65 CITIES

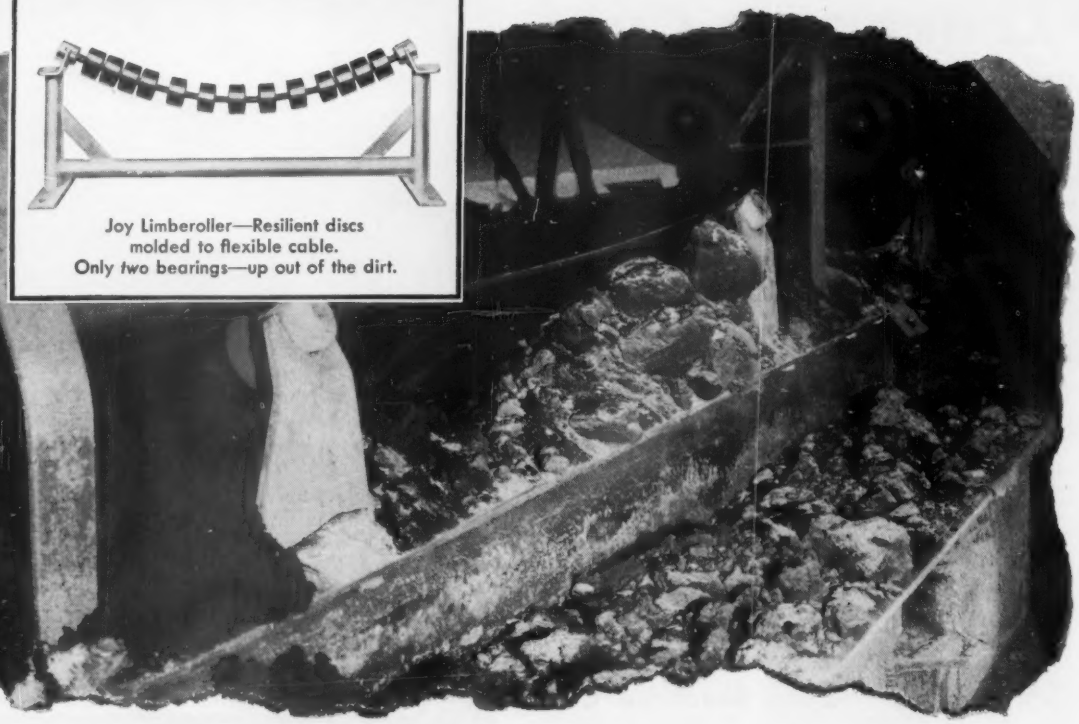
Circle 711 on Page 131

Faster hardness tests on Heavy Odd-Shaped Castings

Large cumbersome castings can be tested more accurately with a portable machine. Such parts can be unreasonably expensive to test with heavy stationary equipment. Without elaborate fixturing, parts may drag, leaving an inaccurate oval impression. The King Portable Brinell Hardness Tester saves handling and set up time, permits fast accurate readings, and is so versatile it soon pays for itself many times over. Weighs less than 30 lbs. Write for complete details and specifications.

KING TESTER CORPORATION
DEPT. F 440 N. 13TH ST. PHILADELPHIA 23, PA.

Circle 722 on Page 131



Joy Limberoller—Resilient discs molded to flexible cable. Only *two* bearings—up out of the dirt.

IN THIS FOUNDRY'S SAND CONVEYOR, JOY IDLERS LAST *TWENTY* TIMES LONGER

THREE YEARS IN SERVICE Joy Limberollers . . . unique, 2-bearing, suspension idlers for belt conveyors . . . have successfully operated in a Midwestern magnesium foundry since February, 1953. They are still going strong after giving twenty times the three-month life of conventional idlers.

SUPPORT 30"/30' BELT The Limberollers were installed on a conveyor belt which carries molding sand from a chute, up a 35° inclined plane, to a transverse belt.

NO BEARING FOULING The bearings are up out of the sand, unaffected by spillage. Fouled bearings, which stop the idler roll and cause damage to the belt, are no longer a problem.

EASY MAINTENANCE There are only two bearings on each idler . . . and that makes the maintenance men happy. They also like the ease with which the Limberoller can be removed . . . without stopping material flow . . . if and when maintenance becomes necessary.

MANAGEMENT HAPPY Such satisfactory service is welcomed by the foundry management. You will be pleased, too, when you discover how the Limberoller can increase efficiency of your belt conveyor operation. For details, see your Joy representative, or write to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada. *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 62-13

Consult a Joy Engineer

about

LIMBEROLLER

THE IDLER WITH FLEX APPEAL

WSW 15503-62

JOY

SINCE 1851—OVER 100 YEARS OF ENGINEERING LEADERSHIP

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Newaygo, Mich.
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Link-Belt Co.
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Prudential Plaza
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National Carbon Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
United States Graphite Co.
Saginaw, Mich.

CARBON DIOXIDE—See GAS

CARBON DIOXIDE (Supply and Gassing Systems)

Archer-Daniels-Midland Co.
Federal Foundry Supply Division
2191 W. 110th St.
Cleveland 2, Ohio.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
International Foundry Supply Co.
Water & Spruce Sts.
Reading, Pa.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.
Pure Carbonic Div.
Air Reduction Co.
150 E. 42nd St.
Socony-Mobil Bldg.
New York, N. Y.

CARS (Core Oven)

Carl-Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.

CARS (Mold Drying)

Carl-Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.

CASTING GRIPS (Air Powered)

Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.

CASTING MACHINES (Centrifugal)

Centrifugal Casting Mach. Co.
Tulsa, Okla.
Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburgh 22, Pa.

CASTING MACHINES (Die)

American Die Casting Machinery Co.
1714 W. Winona
Chicago 40, Ill.
Cast Master, Inc.
23901 Aurora Rd.
Bedford Heights 14, Ohio.

CASTING MACHINES (Permanent Mold)

Centrifugal Casting Machine Co.
Tulsa, Okla.

CASTING SEALER—See IMPREGNATING SYSTEMS

CASTINGS

Acme Foundry Co.
2503—22nd St.
Detroit 16, Mich.
City Pattern Foundry & Machine Co.
1165 Harper
Detroit 11, Mich.
Link-Belt Company
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.

CASTINGS (Storage)

Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio

CEMENT (Metallic)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.

CEMENT (Refractory)

Babcock & Wilcox Co.
161 E. 42nd St.
New York 17, N. Y.
Carborundum Co.
Perth Amboy, N. J.
A. P. Green Fire Brick Co.
Mexico, Mo.
Harbison-Walker Refractories Co.
307 Fifth Ave.
Pittsburgh 22, Pa.
Ironton Fire Brick Co.
Ironton, Ohio.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
North American Refractories Co.
E. 6th National City Bank Bldg.
Cleveland 14, Ohio.
Norton Co.
Worcester 6, Mass.
Chas. Taylor Sons Co.
710 Burns St.
Cincinnati 4, Ohio.

CHAIN (Hoist, Conveyor, Drive, Sling, etc.)

American Chain Div.
American Chain & Cable Co. Inc.
York, Pa.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Columbus-McKinnon Chain Corp.
Tonawanda, N. Y.
Great Western Mfg. Co.
Leavenworth, Kans.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Sterling National Industries Inc.
7036 W. Walker St.
Milwaukee 14, Wis.
Webster Mfg. Co.
Tiffin, Ohio

CHAPLETS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Cleveland Chaplet & Mfg. Co.
26470 Lakeland Blvd.
Cleveland 23, Ohio.
Combined Supply & Equipment Co., Inc.
215 Chandler St.
Buffalo 7, N. Y.
Fanner Mfg. Co.
Brookside Park
Cleveland 9, Ohio.
Milwaukee Chaplet & Mfg. Co.
1023 S. 40th St.
Milwaukee 4, Wis.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.

CHARCOAL

MacDonald Charcoal Co.
1004 Baltimore
Kansas City 5, Mo.

CHEMICALS

General Chemical Division
Allied Chemical Corp.
40 Rector St.
New York 6, N. Y.
Hercules Powder Co.
Wilmington 99, Del.
Olin Mathieson Chemical Corp.
Mathieson Bldg.
Baltimore 3, Md.
Philadelphia Quartz Co.
1062 Public Ledger Bldg.
Philadelphia 6, Pa.
Reichhold Chemicals, Inc.
525 N. Broadway
White Plains, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.

CHILLS

Combined Supply & Equipment Co., Inc.
215 Chandler St.
Buffalo 7, N. Y.
Fanner Mfg. Co.
Brookside Park
Cleveland 9, Ohio.
Milwaukee Chaplet & Mfg. Co.
1023 S. Fourth St.
Milwaukee 4, Wis.
Standard Horse Nail Corp.
New Brighton, Pa.

CHILL COATINGS

Acheson Colloids Co.
Port Huron, Mich.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.

CHILL NAILS—See NAILS (Chill)

CHIPPERS—See PNEUMATIC TOOLS

CHISELS (Chipping)—See PNEUMATIC TOOLS and CHISELS

CHROME COATING

Chromalloy Corp.
120 Broadway
New York 5, N. Y.

CHROMIUM (Briquets)

Electro Metallurgical Co.
Div. Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 6, N. Y.

CLAMPS (Flask)

American Foundry Flask Co.
2745 Southwest Blvd.
Kansas City, Mo.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburgh 22, Pa.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.

CLAY (Bonding)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Baroid Division National Lead Co.
332 S. Michigan Ave.
Chicago 4, Ill.
Cedar Heights Clay Co.
Oak Hill, Ohio.
Eastern Clay Products Dept.
International Minerals & Chemical Corp.
20 N. Wacker Dr.
Chicago 6, Ill.
Harbison-Walker Refractories Co.
307 Fifth Ave.
Pittsburgh 22, Pa.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Ironton Fire Brick Co.
Ironton, Ohio.
Magnet Cove Barium Corp.
3403 Buffalo Speedway
Houston, Tex.
North American Refractories Co.
E. 6th National City Bank Bldg.
Cleveland 14, Ohio.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

CLAY (Refractory)—See REFRACTORIES

CLEANING—See BLAST CLEANING EQUIPMENT

CLEANING COMPOUNDS

Combined Supply & Equipment Co., Inc.
215 Chandler St.
Buffalo 7, N. Y.
Philadelphia Quartz Co.
1062 Public Ledger Bldg.
Philadelphia 6, Pa.

COATINGS—See CORE and MOLD WASH

COKE (Oven)

Alabama By-Products Corp.
Post Office Box 354
Birmingham 1, Ala.

DeBardeleben Coal Corp.
2201 First Ave. N.
Birmingham 3, Ala.
Diamond Alkali Co.
300 Union Commerce Bldg.
Cleveland 14, Ohio.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Pickands, Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Pittsburgh Coke & Chemical Co.
Grant Bldg.
Pittsburgh 19, Pa.
Semet Solvay Div.
Allied Chemical Corp.
40 Rector St.
New York 6, N. Y.

COKE (Petroleum)

Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.

CONVERTER BLOWERS—See BLOWERS

CONVERTERS (Bessemer)

Whiting Corporation
15607 Lathrop Ave.
Harvey, Ill.

CONVEYOR DESIGN

Ajax Flexible Coupling Co. Inc.
Westfield, N. Y.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
C & S Products Co.
18656 Fitzpatrick Ave.
Detroit 28, Mich.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
Planet Corp.
1820 Sunset
Lansing, Mich.

CONVEYORS (Chain)

Anchor Steel & Conveyor Co.
6906 Kingsley Ave.
Dearborn, Mich.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Logan Co.
580 Cabel
Louisville, Ky.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Planet Corp.
1820 Sunset
Lansing, Mich.
Richards-Wilcox Mfg. Co.
174 Third St.
Aurora, Ill.
Standard Conveyor Co.
North St. Paul 9, Minn.
Webster Mfg. Co.
Tiffin, Ohio

CONVEYORS (Fabric, Rubber Belt)

Anchor Steel & Conveyor Co.
6906 Kingsley Ave.
Dearborn, Mich.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
C & S Products Co.
18656 Fitzpatrick Ave.
Detroit 28, Mich.
B. F. Goodrich Co.
Akron 18, Ohio.
Great Western Mfg. Co.
Leavenworth, Kans.
Imperial Belting Co.
1800 S. Kilbourn Ave.
Chicago 23, Ill.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Logan Co.
580 Cabel
Louisville, Ky.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
Modern Equipment Co.
Port Washington, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Pekay Machine & Engineering Co.
865 N. Sangamon St.
Chicago 22, Ill.
Planet Corp.
1820 Sunset
Lansing 6, Mich.
Quaker Rubber Div.
H. K. Porter Co., Inc.
Tacony & Comly Sts.
Philadelphia 24, Pa.
Standard Conveyor Co.
North St. Paul 9, Minn.
United States Rubber Co.
1230 Ave. of the Americas
New York 20, N. Y.
Webster Mfg. Co.
Tiffin, Ohio
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

CONVEYORS (Gravity Roller)

Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Logan Co.
580 Cabel
Louisville, Ky.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
Standard Conveyor Co.
North St. Paul 9, Minn.

CONVEYORS (Live Roller)

Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Logan Co.
580 Cabel
Louisville, Ky.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Standard Conveyor Co.
North St. Paul 9, Minn.

CONVEYORS (Mold)

Anchor Steel & Conveyor Co.
6906 Kingsley Ave.
Dearborn, Mich.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
1155 E. 283rd St.
Wickliffe, Ohio.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Logan Co.
580 Cabel
Louisville, Ky.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
Planet Corp.
1820 Sunset
Lansing 6, Mich.
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

CONVEYORS (Overhead Monorail)

American MonoRail Co.
13104 Athens Ave.
Cleveland 7, Ohio.
Anchor Steel & Conveyor Co.
6906 Kingsley Ave.
Dearborn, Mich.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
1155 E. 283rd St.
Wickliffe, Ohio.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Mathews Conveyer Co.
104 Tenth St.
Ellwood City, Pa.
Modern Equipment Co.
Port Washington, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Penn Iron Works Inc.
Reading, Pa.
Planet Corp.
1820 Sunset
Lansing 6, Mich.
Richards-Wilcox Mfg. Co.
174 Third St.
Aurora, Ill.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CONVEYORS (Pneumatic)

Fuller Company
Catasauqua, Pa.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Spencer Turbine Co.
Hartford, Conn.
Whirl Air Flow Corp.
650—25th Ave. S.E.
Minneapolis 14, Minn.

CONVEYORS (Portable)

C & S Products Co.
18656 Fitzpatrick Ave.
Detroit 28, Mich.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.

CONVEYORS (Vibrating, Oscillating)

Ajax Flexible Coupling Co., Inc.
Westfield, N. Y.
Carrier Conveyor Corp.
211 N. Jackson St.
Louisville 2, Ky.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Simplicity Engineering Co.
Durand, Mich.

COPPER

Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

COPPER SHOT

Alloy Metal Products, Inc.
Rockingham Rd.
Davenport, Iowa.
Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

CORE BINDERS (Air Setting)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Reichhold Chemicals, Inc.
525 N. Broadway
White Plains, N. Y.
G. E. Smith, Inc.
246 Washington Road
Pittsburgh 16, Pa.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

CORE BINDERS (Cereal)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Corn Products Refining Co.
17 Battery Pl.
New York 4, N. Y.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Robeson Process Co.
P. O. Box 960
Erie, Pa.

CORE BINDERS (Oil)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Cities Service Oil Co.
20 N. Wacker Dr.
Chicago 6, Ill.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Smith Oil & Refining Co.
1102 Kilburn Ave.
Rockford, Ill.
Frederic B. Stevens, Inc.
16th & Vernor Highway
Detroit 16, Mich.
Reichhold Chemicals, Inc.
525 N. Broadway
White Plains, N. Y.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.

CORE BINDERS (Pitch)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Penn-Rilton Co.
324 W. 23rd St.
New York 11, N. Y.
Frederic B. Stevens, Inc.
16th & Vernor Highway
Detroit 16, Mich.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

CORE BINDERS (Resin)

Acme Resin Corp.
401 Circle Ave.
Forest Park, Ill.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Bakelite Corp., Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Durez Plastics Div., Hooker Chemical Corp.
1011 Walck Rd.
North Tonawanda, N. Y.
General Electric Co.
Chemical Materials Dept.
1 Plastics Ave.
Pittsfield, Mass.
Hercules Powder Co.
Wilmington 99, Del.
Reichhold Chemicals, Inc.
525 N. Broadway,
White Plains, N. Y.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

CORE BINDERS (Sodium Silicate)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Cardox Corp.
307 N. Michigan Ave.
Chicago 1, Ill.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Diamond Alkali Co.
300 Union Commerce Bldg.
Cleveland 14, Ohio.
E. I. Du Pont de Nemours & Co. Inc.
Wilmington 98, Del.
Eastern Clay Products Dept., International Minerals & Chemical Corp.
20 N. Wacker Drive
Chicago 6, Ill.
Foundry Services, Inc.
1045 South High St.
Columbus 6, Ohio.
International Foundry Supply Co.
Water & Spruce Sts.
Reading, Pa.
Philadelphia Quartz Co.
1062 Public Ledger Bldg.
Philadelphia 6, Pa.
Frederic B. Stevens, Inc.
18th & Vernor Highway
Detroit 16, Mich.

CORE BLOWER BUSHINGS

Eastern Clay Products Dept., International Minerals & Chemical Corp.
20 N. Wacker Drive
Chicago 6, Ill.

CORE BLOWING MACHINES

Beardsley & Piper
Div., Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.

Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Demmler Mfg. Co.
Kewanee, Ill.
International Molding Machine Co.
LaGrange Park, Ill.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
Redford Iron & Equipment Co.
20733 Glendale Ave.
Detroit 23, Mich.

COREBOXES

Accurate Match Plate Co.
1847 W. Carroll St.
Chicago, Ill.

CORE DRAWING MACHINES

Beardsley & Piper Div., Pettibone-Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
Greenlee Bros. & Co.
2136 Twelfth St.
Rockford, Ill.
International Molding Machine Co.
LaGrange Park, Ill.

CORE DRYERS

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.

CORE GRINDERS (Power Operated)

Sutter Products Co.
Hadley & Grant Sts.
Holly, Mich.

CORE KNOCKOUT MACHINES

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.

COREMAKING MACHINES

Beardsley & Piper
Div., Pettibone-Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Demmler Mfg. Co.
Kewanee, Ill.
Foundry Equipment Ltd.
Leighton Buzzard, Bedfordshire
England.
Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburgh 22, Pa.
International Molding Machine Co.
LaGrange Park, Ill.
Johnston & Jennings Div., Pettibone-Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
Redford Iron & Equipment Co.
20733 Glendale Ave.
Detroit 23, Mich.
SPO, Inc.
7500 Grand Division Ave.
Cleveland 25, Ohio.
Shell Process Inc.
Bliss & Parkside Sts.
West Springfield, Mass.
Tabor Mfg. Co., Div.
Turbo Machine Co.
Lansdale, Pa.

CORE OILS—See CORE BINDERS

CORE and MOLD OVENS

Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio.
J. O. Ross Engineering Corp.
444 Madison Ave.
New York 17, N. Y.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
Stroman Furnace & Engineering
Div. of Petersen Oven Co.
9900 Franklin Ave.
Franklin Park, Ill.

CORE PASTE

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Corn Products Refining Co.
17 Battery Pl.
New York 4, N. Y.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Eastern Clay Products, Dept.
International Minerals & Chemical Corp.
20 N. Wacker Dr.
Chicago 6, Ill.
Foundry Services, Inc.
1045 South High St.
Columbus 6, Ohio.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Frederic B. Stevens, Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

CORE PLATES (Steel, Aluminum, Magnesium, Asbestos)

American Foundry Flask Co.
2745 Southwest Blvd.
Kansas City, Mo.
Johns-Manville
22 E. 40th St.
New York 16, N. Y.
Moltrup Steel Products Co.
Beaver Falls, Pa.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

CORE ROD STRAIGHTENING and CUTTING MACHINERY

Wheelabrator Corp.
Mishawaka, Ind.

CORE SAND—See SAND

CORE SAND MIXERS—See SAND PREPARATION EQUIPMENT

CORE SHOOTING MACHINES

Hansberg Shooters, Inc.
3213 Central
Evanston, Ill.

CORE STRIPPERS—See CORE DRAWING MACHINES

CORE TESTING EQUIPMENT

Detroit Testing Machine Co.
19390 Grinnell Ave.
Detroit 13, Mich.
Harry W. Dietert Co.
9330 A Roselawn Ave.
Detroit 4, Mich.
Claud S. Gordon Co.
3000 S. Wallace
Chicago 16, Ill.

CORE TRUCKS—See TRUCKS (Core)

CORE VENTS

Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Demmler Mfg. Co.
Kewanee, Ill.
Domestic Industries
470 W. Broad St.
Columbus 23, Ohio.
Smillie, C. M., & Co.
1124 Woodward Heights Blvd.
Ferndale 20, Mich.

CORE and MOLD WASH

Acheson Colloids Co.
Port Huron, Mich.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Carborundum Co.
Perth Amboy, N. J.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Cities Service Oil Co.
20 N. Wacker Dr.
Chicago 6, Ill.
Corn Products Refining Co.
17 Battery Pl.
New York 4, N. Y.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
DeVilbiss Metal Fabricators Co.
17900 Ryan Rd.
Detroit 12, Mich.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
National Carbon Co., Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Pennsylvania Pulverizing Co.
140 Stanwix St.
Pittsburgh 22, Pa.
Smith Oil & Refining Co.
1102 Kilburn Ave.
Rockford, Ill.
Stevens, Frederic B., Inc.
18th St. & Vernor Highway
Detroit 26, Mich.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.
United States Graphite Co.
Saginaw, Mich.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

CORES (Annealing)

Pressed Steel Co.
Wilkes-Barre, Pa.

CORES (Strainer, Riser, Breakoff)

Keystone Refractories Co.
120 Liberty St.
New York 6, N. Y.
Louthan Corp.
East Liverpool, Ohio.
Porcelain Products, Inc.
Findlay, Ohio.
Rudow Mfg. Co.
2602 Venice Rd.
Sandusky, Ohio.
Universal Clay Products
Sandusky, Ohio.

COUNTERS (Casting, Cores, Molds)

Hartley Controls Corp.
P. O. Box 290
Neenah, Wis.

COUPLINGS (Air, Hydraulic)

Airetool Mfg. Co.
Springfield, Ohio.
Bellows Co.
230 W. Market St.
Akron 3, Ohio.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
B. F. Goodrich Co.
Industrial Div.
Akron, Ohio.
C. B. Hunt & Sons Inc.
Salem, Ohio.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

COUPLINGS (Flexible, Shaft)

Ajax Flexible Coupling Co., Inc.
Westfield, N. Y.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.

CRANES (Bucket)

Harnischfeger Corp.
4400 W. National Ave.
Milwaukee 46, Wis.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CRANES (Gantry)

Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
Wickliffe, Ohio.
Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Harnischfeger Corp.
4400 W. National Ave.
Milwaukee 46, Wis.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Modern Equipment Co.
Port Washington, Wis.

CRANES (Jib)

American Chain & Cable Co., Inc.
Wright Hoist Div.
York, Pa.
American MonoRail Co.
13104 Athens Ave.
Cleveland 7, Ohio.
Chisholm-Moore Hoist Div.
Columbus-McKinnon Chain Corp.
Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
Wickliffe, Ohio.
Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Harnischfeger Corp.
4400 W. National Ave.
Milwaukee 46, Wis.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Modern Equipment Co.
Port Washington, Wis.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CRANES (Monorail—Electric and Hand)

American Chain & Cable Co., Inc.
Wright Hoist Div.
York, Pa.
American MonoRail Co.
13104 Athens Ave.
Cleveland 7, Ohio.
Chisholm-Moore Hoist Div.
Columbus-McKinnon Chain Corp.
Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
1155 E. 283rd St.
Wickliffe, Ohio.
Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Harnischfeger Corp.
4400 W. National Ave.
Milwaukee 46, Wis.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Modern Equipment Co.
Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp.
Montour Falls, N. Y.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CRANES (Self-Propelled)

American Chain & Cable Co., Inc.
Wright Hoist Div.
York, Pa.
Harnischfeger Corp.
4400 W. National Ave.
Milwaukee 46, Wis.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Modern Equipment Co.
Port Washington, Wis.

CRUCIBLES

Ajax Electrothermic Corp.
Ajax Park
Trenton, N. J.
American Refractories & Crucible Corp.
North Haven, Conn.
Crucible Manufacturers Association
11 W. 42nd St.
New York 36, N. Y.
Dixon, Joseph, Crucible Co.
Jersey City 3, N. J.
Electro Refractories & Abrasives Corp.
Vars Bldg.
Buffalo 2, N. Y.
Great Lakes Carbon Co.
18 E. 48th St.
New York 17, N. Y.
Inductotherm Corp.
412 Illinois Ave.
Delanco, New Jersey.
Lava Crucible Co.
Pittsburgh, Pa.
National Carbon Co., Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Ross-Tacony Crucible Co.
Tacony, Philadelphia, Pa.
Vesuvius Crucible Co.
Swissvale, Pa.

CRUCIBLE POURING DEVICES

Modern Equipment Co.
Port Washington, Wis.

CRUSHERS (Core)

Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Newaygo Engineering Co.
Newaygo, Mich.
Simplicity Engineering Co.
Durand, Mich.

CUPOLAS

Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
Modern Equipment Co.
Port Washington, Wis.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CUPOLA (Hot Blast Equipment)

Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
Brown Fintube Co.
Elyria, Ohio.
Modern Equipment Co.
Port Washington, Wis.
J. O. Ross Engineering Corp.
444 Madison Ave.
New York 17, N. Y.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CUPOLA BLOWERS

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.
Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Spencer Turbine Co.
Hartford, Conn.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CUPOLA CHARGING MACHINES

American MonoRail Co.
13104 Athens Ave.
Cleveland 7, Ohio.
Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
Wickliffe, Ohio.
Harnischfeger Corp.
4400 W. National Ave.
Milwaukee 46, Wis.
Modern Equipment Co.
Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp.
Montour Falls, N. Y.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CUPOLA CONTROL EQUIPMENT

Foxboro Company
Foxboro, Mass.
Leeds & Northrup
4901 Stenton Ave.
Philadelphia 44, Pa.

CUPOLA DUST ARRESTORS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

CUPOLA LIGHTERS

Hickman-Williams Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

CUPOLA LININGS—See REFRACTORIES

CUPOLA PATCHING GUNS—See REFRACTORY GUNS

CUTOFF MACHINES (Abrasive)

Fox Grinders Inc.
Oliver Bldg.
Pittsburgh, Pa.
Tabor Mfg. Co., Div. Turbo Machine Co.
Lansdale, Pa.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.

CUTOFF WHEELS

Bay State Abrasive Products Co.
Westboro, Mass.
Carborundum Co.
Niagara Falls, N. Y.
Cincinnati Milling Products Div.
4701 Marburg Ave.
Cincinnati 9, Ohio.
Electro Metallurgical Co., Div. of Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Macklin Company
Jackson, Mich.
Norton Company
Worcester 6, Mass.
Raybestos-Manhattan, Inc.
Manhattan Rubber Division
Passaic, N. J.
Simonds Abrasive Co.
Tacony & Fraley Sts.
Philadelphia 37, Pa.

CYLINDERS (Air)

Bellows Co.
230 W. Market St.
Akron 3, Ohio.
Galland-Henning Mfg. Co.
2753 S. 31st St.
Milwaukee 46, Wis.
Miller Fluid Power Co.
2040 N. Hawthorne
Melrose Park, Ill.

CYLINDERS (Hydraulic)

Bellows Co.
230 W. Market St.
Akron 3, Ohio.
Galland-Henning Mfg. Co.
2753 S. 31st St.
Milwaukee 46, Wis.
Miller Fluid Power Co.
2040 N. Hawthorne
Melrose Park, Ill.

DARK ROOM ACCESSORIES—See X-RAY FILM and ACCESSORIES

DEGASIFIERS and DEOXIDIZERS

Carborundum Co.
Niagara Falls, N. Y.
Cleveland Flux Co.
1026 Main St.
Cleveland 13, Ohio.
Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
Pittsburgh Metals Purifying Co.
P.O. Box 568
Mars, Pa.

DESIGN TESTING

Magnaflux Corp.
7300 W. Lawrence Ave.
Chicago 31, Ill.

DESULPHURIZERS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Cleveland Flux Co.
1026 Main St.
Cleveland 13, Ohio.
Columbia-Southern Chemical Corp.
Div. Pittsburgh Plate Glass Co.
Pittsburgh 19, Pa.
Foundry Services, Inc.
1045 South High St.
Columbus 6, Ohio.
Hercules Powder Co.
Wilmington 99, Del.
Modern Equipment Co.
Port Washington, Wis.
Olin Mathieson Chemical Corp.
Mathieson Bldg.
Baltimore 3, Md.
Pittsburgh Metals Purifying Co.
P.O. Box 568
Mars, Pa.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

DOWEL PINS

Standard Horse Nail Corp.
New Brighton, Pa.

DRILLS (Electric)

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.

DRILLS (Pneumatic)

Airetool Mfg. Co.
Springfield, Ohio.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Gardner-Denver Co.
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Master Pneumatic Tool Co., Inc.
13 Krick Rd.
Bedford, Ohio.

DRIVES (Gear, Variable Speed)

Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.

DRUMS (Magnetic)—See SEPARATORS (Magnetic)

DUMP HOPPERS

Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.

DUMP TRUCKS

Kwik-Mix Co.
3026 W. Concordia
Milwaukee 16, Wis.
Tractomotive Corp.
Deerfield, Ill.

DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

American Air Filter Co., Inc.
266 Central Ave.
Louisville 8, Ky.
Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
De Vilbiss Metal Fabricators Co.
300 Phillips Ave.
Detroit 12, Mich.
Hawley Mfg. Co.
411 North Wabash
Wabash, Indiana
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
Lennox Industries Inc.
Box 1294
Des Moines 5, Iowa.
Modern Equipment Co.
Port Washington, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
J. O. Ross Engineering Corp.
444 Madison Ave.
New York 17, N. Y.
Claude B. Schneible Co.
P.O. Box 296 Roosevelt Park
Detroit 32, Mich.
Tabor Mfg. Co.
Div. Turbo Machine Co.
Lansdale, Pa.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.
Wheelabrator Corp.
Mishawaka, Ind.

ELECTRIC FURNACE (See Furnaces, Electric)

ELECTRODE HOLDERS AND BUS TUBES (Rebuilding Service)

Wilson Welding Company, Inc.
221 High St., Altizer Addition
Huntington, W. Va.

ELECTRODES, FURNACE (Graphite and Amorphous)

Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.
National Carbon Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Arcair Co.
465 South Mt. Pleasant Ave.
Lancaster, Ohio

ELECTRODES and RODS (Welding)

Carborundum Co.
Perth Amboy, N. J.
Harnischfeger Corp.
4400 W. National Ave.
Milwaukee 46, Wis.
International Nickel Co., Inc.
67 Wall St.
New York 5, N. Y.
Linde Co., Div.
Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.
National Carbon Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

ELEVATORS (Bucket)—See BUCKETS (elevating, Clam Shell, Drag Line, Grab, LOADER, Dumping)

ELEVATORS (Pneumatic, Material Handling)

Fuller Co.
Catasauqua, Pa.

ENGINEERING SERVICE (Foundry)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Edwin S. Carman
1643 Lee Road
Cleveland 18, Ohio.
Foundry Design Co.
106 S. Hanley Rd.
St. Louis 5, Mo.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Lester B. Knight & Associates, Inc.
549 W. Randolph St.
Chicago 6, Ill.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.
Modern Equipment Co.
Port Washington Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Pekay Machine & Engineering Co.
865 N. Sangamon St.
Chicago 22, Ill.
Westover Corp.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

EXHAUST—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

EXOTHERMIC PRODUCTS—See RISER COMPOUNDS

FABRICATORS (Metal)

DeVilbiss Metal Fabricators Co.
17900 Ryan Rd.
Detroit 12, Mich.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Modern Equipment Co.
Port Washington, Wis.
Newaygo Engineering Co.
Newaygo, Mich.
Penn Iron Works, Inc.
Reading, Pa.
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

FACINGS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Delta Oil Products Co.
6263 Cedarbury Rd.
Milwaukee 9, Wis.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
National Carbon Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Penn-Ritton Co.
324 W. 23rd St.
New York 11, N. Y.
Stevens Inc., Frederic B.
18th & Vernor Highway
Detroit 16, Mich.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
United States Graphite Co.
Saginaw, Mich.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

FANS—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

FEEDERS (Belt)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.

FEEDERS (Plate)

Bartlett & Snow Co., C. O.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Fuller Company
Catasauqua, Pa.
Great Western Mfg. Co.
Leavenworth, Kans.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.

Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Newaygo Engineering Co.
Newaygo, Mich.

FEEDERS (Screw)

Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.

FEEDERS (Vibrating)

Ajax Flexible Coupling Co. Inc.
Westfield, N. Y.
Carrier Conveyor Corp.
211 N. Jackson St.
Louisville 2, Ky.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Simplicity Engineering Co.
Durand, Mich.

FERROBORON

Electro Metallurgical Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

FERROCHROME

Electro Metallurgical Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
Ohio Ferro Alloys Corp.
Canton 9, Ohio.
Pickands, Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

FERROCOLUMBIUM

Electro Metallurgical Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

FERROMANGANESE

Electro Metallurgical Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
Ohio Ferro Alloys Corp.
Canton 9, Ohio.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

FERROMOLYBDENUM

Climax Molybdenum Co.
500 Fifth Ave.
New York 36, N. Y.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.

FERROPHOSPHORUS

Eastern Clay Products Dept.
International Minerals & Chemical Corp.
20 N. Wacker Drive
Chicago 6, Ill.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.

FERROSILICON

Electro Metallurgical Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
Keokuk Electro Metals Co.
320 Concert St.
Keokuk, Iowa.
Miller & Company
332 S. Michigan Ave.
Chicago 4, Ill.
Ohio Ferro Alloys Corp.
Canton 9, Ohio.
Pickands, Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

FERROTITANIUM

Electro Metallurgical Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

FERROTUNGSTEN

Electro Metallurgical Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

FERROVANADIUM

Electro Metallurgical Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

FILTERS (Air)

American Air Filter Co.
266 Central Ave.
Louisville 8, Ky.
Bellows Co.
230 W. Market St.
Akron 3, Ohio.
James A. Murphy & Co.
Hamilton, Ohio.
Wheelabrator Corp.
Mishawaka, Ind.

FIRE BRICK, CLAY, SAND, STONE—See REFRACTORIES

FLASK BANDS—See BANDS (Snap Flask)

FLASK BUSHINGS, PINS and FITTINGS

Adams Co.
Dubuque, Iowa.
American Foundry Flask Co.
2745 Southwest Blvd.
Kansas City, Mo.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Smillie & Co., C. M.
1124 Woodward Hgts. Blvd.
Ferndale 20, Mich.
Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.

FLASK FILLERS

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero
Chicago 39, Ill.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.

FLASK LIFT MACHINES—See PATTERN DRAW MACHINES

FLASKS (Aluminum, Magnesium)

Adams Co.
Dubuque, Iowa.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Fremont Flask Co.
Fremont, Ohio.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.

FLASKS (Slip)

Adams Co.
Dubuque, Iowa.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Fremont Flask Co.
Fremont, Ohio.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.
Newaygo Engineering Co.
Newaygo, Mich.

FLASKS (Snap)

Adams Co.
Dubuque, Iowa.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Fremont Flask Co.
Fremont, Ohio.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.
Newaygo Engineering Co.
Newaygo, Mich.
Stevens, Inc., Frederic B.
18th & Vernor Highway
Detroit 16, Mich.

FLASKS (Steel)

American Foundry Flask Co.
2745 Southwest Blvd.
Kansas City, Mo.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.

FLASKS (Wood)

Adams Co.
Dubuque, Iowa.
Chicago Mfg. & Distributing Co.
1928 W. 46th St.
Chicago 9, Ill.

FLOORING (Non-Slip)

Harbison Walker Refractories Co.
307 Fifth Ave.
Pittsburgh 22, Pa.
Norton Co.
Worcester 6, Mass.

FLUXES

Cleveland Flux Co.
1026 Main St.
Cleveland 13, Ohio.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
General Chemical Division
Allied Chemical Corp.
40 Rector St.
New York 6, N. Y.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Olin Mathieson Chemical Corp.
Mathieson Bldg.
Baltimore 3, Md.
Pittsburgh Metals Purifying Co.
P.O. Box 568
Mars, Pa.
Superflux Mfg. Co.
16125 Cleophus Ave.
Allen Park 10, Mich.

FLUXES (Soldering, Welding, and Tinning)

Linde Co., Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.

FOUNDRY ENGINEERS—See ENGINEERING SERVICE

FOUNDRY LAYOUT and METHODS—See ENGINEERING SERVICE (Foundry)

FOUNDRY NAILS

Standard Horse Nail Corp.
New Brighton, Pa.

FOUNDRY SUPPLY HOUSES

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Baroid Div., National Lead Co.
332 S. Michigan Ave.
Chicago 4, Ill.
Combined Supply & Equipment Co. Inc.
215 Chandler St.
Buffalo 7, N. Y.
Eastern Clay Products, Dept.
International Minerals & Chemical Corp.
20 N. Wacker Dr.
Chicago 6, Ill.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
Stevens, Inc., Frederic B.
18th & Vernor Highway
Detroit 16, Mich.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.

FURNACE BLOWERS—See BLOWERS

FURNACE LINING—See REFRACTORIES

FURNACES (Air)

Swindell-Dressler Corp.
Box 188
Pittsburgh 30, Pa.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

FURNACES (Electric Melting)

Ajax Electrothermic Corp.
Ajax Park
Trenton, N. J.
Ajax Engineering Corp.
Trenton, N. J.
American Bridge, Div. United States Steel Corp.
525 Wm. Penn Pl.
Pittsburgh 19, Pa.
Detroit Electric Furnace Div. of Kuhlman Electric Co.
Bay City, Mich.
Inductotherm Corp.
412 Illinois Ave.
Delanco, N. J.
Lectromelt Furnace Co. Div.
McGraw Edison Co.
P.O. Box 1125
Pittsburgh, Pa.
Lindberg Engineering Co.
Lindberg-Fisher Div.
2450 W. Hubbard St.
Chicago 12, Ill.
Ohio Crankshaft Co.
Tocco Division
4620 E. 71st St.
Cleveland 5, Ohio.
Swindell-Dressler
Box 188
Pittsburgh 30, Pa.
Westinghouse Electric Corp.
2519 Wilkens Ave.
Baltimore 3, Md.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

FURNACES (Gas or Oil Fired Melting)

Campbell-Hausfeld Co.
Harrison, Ohio.
Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
Denver Fire Clay Co.
2301 Blake St.
Denver 2, Colo.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
International Foundry Supply Co.
Water & Spruce Sts.
Reading, Pa.
Johnston Mfg. Co.
Minneapolis 13, Minn.
Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio.
Lindberg Engineering Co.
Lindberg-Fisher Div.
2450 W. Hubbard,
Chicago 12, Ill.
Reda Pump Co.
Bartlesville, Okla.
Stroman Furnace & Engineering Co.
Div. of Petersen Oven Co.
9900 Franklin Ave.
Franklin Park, Ill.
Swindell-Dressler Corp.
Box 188
Pittsburgh 30, Pa.

FURNACES (Heat Treating and Annealing)

Ajax Electric Co., Inc.
Philadelphia 23, Pa.
Ajax Electrothermic Corp.
Ajax Park
Trenton, N. J.
Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.
Carl Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Johnston Mfg. Co.
Minneapolis 13, Minn.

Inductotherm Corp.
412 Illinois Ave.
Delanco, N. J.
Lanly Company
2800 Euclid Ave.
Cleveland 15, Ohio.
Leeds & Northrup
4901 Stenton Ave.
Philadelphia 44, Pa.
Lindberg Engineering Co.
Heat Treating Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
Ohio Crankshaft Co.
Tocco Division
4620 E. 71st St.
Cleveland 5, Ohio.
Swindell-Dressler Corp.
Box 188
Pittsburgh 30, Pa.
Whiting Corporation
15607 Lathrop Ave.
Harvey, Ill.

GAGGERS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.

GAS (Oxygen, Acetylene, Carbon Dioxide, Industrial)

Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
International Foundry Supply Co.
Water & Spruce Sts.
Reading, Pa.
Linde Co.
Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. La Salle St.
Chicago 3, Ill.
Pure Carbonic Div.
Air Reduction Co.
150 E. 42nd St.
Socony-Mobil Bldg.
New York 17, N. Y.

GAS BURNERS—See BURNERS

GENERATORS (Acetylene)

Linde Co.
Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.

GLOVES—See SAFETY EQUIPMENT
GOGGLES and EYE PROTECTORS

American Optical Co.
Southbridge, Mass.

GRAPHITE and GRAPHITE BRIQUETS

Acheson Colloids Co.
Port Huron, Mich.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.
National Carbon Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Stevens, Frederic B., Inc.
18th & Vernor Highway
Detroit 16, Mich.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
United States Graphite Co.
Saginaw, Mich.

GRINDERS (Electric Portable)

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.

GRINDERS (Pneumatic Portable)

Airetool Mfg. Co.
Springfield, Ohio.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Gardner-Denver Co.
Gardner Drive
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Master Pneumatic Tool Co., Inc.
13 Krick Rd.
Bedford, Ohio.

GRINDERS (Surface, Bench, Disc, Floor)

Carborundum Co.
Perth Amboy, N. J.
Fox Grinders Inc.
Oliver Bldg.
Pittsburgh 22, Pa.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Oliver Machinery Co.
Grand Rapids 1, Mich.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.

GRINDERS (Swing Frame)

Fox Grinders, Inc.
Oliver Bldg.
Pittsburgh 22, Pa.
U. S. Electrical Tool Co.
3640 Llewellyn St.
Cincinnati 23, Ohio.

GRINDING WHEELS

Atlantic Abrasive
South Braintree, Mass.
Bay State Abrasive Products Co.
Westboro, Mass.
Carborundum Co.
Niagara Falls, N. Y.
Cincinnati Milling Products Div.
4701 Marburg Ave.
Cincinnati 9, Ohio.
Keystone Abrasive Wheel Co.
Carnegie, Pa.
Macklin Co.
Jackson, Mich.
Mid West Abrasive Co.
Owosso, Mich.
Norton Company
Worcester 6, Mass.
Raybestos-Manhattan, Inc.
Manhattan Rubber Division
Passaic, N. J.
Simonds Abrasive Co.
Tacony & Fraley Sts.
Philadelphia 37, Pa.
United States Rubber Co.
1230 Ave. of the Americas
New York 20, N. Y.

GRINDING WHEEL DRESSERS

Carborundum Co.
Niagara Falls, N. Y.
Desmond-Stephan Mfg. Co.
Urbana, Ohio.
Norton Co.
Worcester, Mass.

GRINDING WHEEL GUARDS

Carroll Pressed Metal, Inc.
131 Dewey St.
Worcester, Mass.

GRINDSTONES—See GRINDING WHEELS

GRIT—See SHOT and GRIT

HAMMERS (Chipping)—See PNEUMATIC TOOLS and CHISELS

HARDNESS TESTING EQUIPMENT

Detroit Testing Machine Co.
19390 Grinnell Ave.
Detroit 13, Mich.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.

HEAT CONTROL AND RECORDING DEVICES

Claud S. Gordon Co.
3000 S. Wallace
Chicago 16, Ill.
Leeds & Northrup
4901 Stenton Ave.
Philadelphia 44, Pa.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
Marshall Co., L. H.
270 W. Lane
Columbus 2, Ohio.
Minneapolis-Honeywell Co.
Wayne and Windrim Aves.
Philadelphia 44, Pa.

HEATERS (High Frequency Electric)

Ajax Electrothermic Corp.
Ajax Park
Trenton, N. J.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 11, Ill.
Ohio Crankshaft Co.
Tocco Div.
4620 E. 71st St.
Cleveland 5, Ohio.

HEATERS (Space, Unit, Oven, Water)

American Air Filter Co. Inc.
266 Central Ave.
Louisville 8, Ky.
Carl-Mayer Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.
DeVilbiss Metal Fabricators Co.
17900 Ryan Rd.
Detroit 12, Mich.
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Lanly Co.
2800 Euclid Ave.
Cleveland 15, Ohio.
Lennox Industries, Inc.
Marshalltown, Iowa.

HELMETS (Blasting)

American Optical Co.
Southbridge, Mass.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Wheelabrator Corp.
Mishawaka, Ind.

HELMETS (Welding)

American Optical Co.
Southbridge, Mass.

HOISTS (Air)

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Gardner-Denver Co.
Quincy, Ill.
Galland-Henning Mfg. Co.
2753 S. 31st St.
Milwaukee 46, Wis.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Master Pneumatic Tool Co., Inc.
13 Krick Rd.
Bedford, Ohio.
Miller Fluid Power Co.
2040 N. Hawthorne
Melrose Park, Ill.

HOISTS (Chain, Hand)

American Chain & Cable Co., Inc.
Wright Hoist Div.
York, Pa.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Chisholm-Moore Hoist Div.
Columbus-McKinnon Chain Corp.
Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
1155 E. 283rd St.
Wickliffe, Ohio.
Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Harnischfeger Corp.
4400 W. National Ave.
Milwaukee 46, Wis.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Modern Equipment Co.
Port Washington, Wis.
Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

HOISTS (Electric)

American Chain & Cable Co., Inc.
Wright Hoist Div.
York, Pa.
American Engineering Co.
Wheatsheaf Lane & Sepviva St.
Philadelphia 37, Pa.
Chisholm-Moore Hoist Div.
Columbus-McKinnon Chain Corp.
Tonawanda, N. Y.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co.
1155 E. 283rd St.
Wickliffe, Ohio.
Euclid Crane & Hoist Co.
1365 Chardon Rd.
Cleveland 17, Ohio.
Harnischfeger Corp.
4400 W. National Ave.
Milwaukee 46, Wis.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Manning, Maxwell & Moore, Inc.
Muskegon, Mich.
Modern Equipment Co.
Port Washington, Wis.
Shepard-Niles Crane & Hoist Corp.
Montour Falls, N. Y.
Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

HOISTS (Skip)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Gardner-Denver Co.
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Link-Belt Co.
Dept 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Modern Equipment Co.
Port Washington, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Whiting Corporation
15607 Lathrop Ave.
Harvey, Ill.

HOODS (Shakeout, Pouring and Cooling)—See DUST, COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

HOSE (Air, Blasting, Water, Gas)

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Gardner-Denver Co.
Quincy, Ill.
B. F. Goodrich Co.
Akron, Ohio.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Quaker Rubber Div.
H. K. Porter Co.
Tacony & Comly Sts.
Philadelphia 24, Pa.
Raybestos-Manhattan, Inc.
Manhattan Rubber Div.
Passaic, N. J.
United States Rubber Co.
1230 Ave. of Americas
New York 20, N. Y.

HOSE FITTING and REELS

B. F. Goodrich Co.
Industrial Div.
Akron, Ohio.
C. B. Hunt & Son, Inc.
Salem, Ohio
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

HOT TOP MATERIAL—See RISER COMPOUNDS

HYDRAULIC CLEANING—See BLAST CLEANING EQUIPMENT

IMPREGNATING SYSTEMS and CASTING SEALER

Imprex Division
Ideal Industries, Inc.
2023 S. 60th St.
Milwaukee 14, Wis.
Prenco Products, Inc.
507 E. Ten Mile Rd.
Hazel Park, Mich.
Tousey Varnish Co.
520 W. 25th St.
Chicago 16, Ill.

INGOT MOLDS

Acme Foundry Co.
2503 22nd St.
Detroit 16, Mich.
Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.
National Carbon Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.

INGOTS—(See type of metal)

INOCULANTS

Carborundum Co.
Perth Amboy, N. J.
Electro Metallurgical Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.
United States Graphite Co.
Saginaw, Mich.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

INSPECTION EQUIPMENT
Allis-Chalmers
Milwaukee 1, Wis.
Budd Co.
Nuclear Systems Div.
2950 Roberts Ave.
Philadelphia 29, Pa.
Detroit Testing Machine Co.
9390 Grinnell Ave.
Detroit 13, Mich.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
Eastman Kodak Co.
Rochester, N. Y.
Magnaflux Corp.
7300 W. Lawrence Ave.
Chicago 31, Ill.
Picker X-Ray Corp.
25 S. Broadway
White Plains, N. Y.
Westinghouse Electric Corp.
2519 Wilkens Ave.
Baltimore 3, Md.

INSTALLATION (Foundry Equipment)
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.

IRON ORE
Pickands, Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.

IRON OXIDES
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Tamms Industries Co.
228 N. La Salle St.
Chicago 1, Ill.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.

JACKETS (Mold)—See MOLD JACKETS

LABORATORY EQUIPMENT (Chemical)
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
Great Western Mfg. Co.
Leavenworth, Kans.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.

LABORATORY EQUIPMENT (Physical)
Baird-Atomic, Inc.
33 University Rd.
Cambridge 38, Mass.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
Gordon, Claud S., Co.
3000 S. Wallace
Chicago 16, Ill.
Great Western Mfg. Co.
Leavenworth, Kans.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Norton Co.
Worcester 6, Mass.

LADLES
Industrial Equipment Co.
Minster, Ohio.
Modern Equipment Co.
Port Washington, Wis.
Stevens, Frederic B., Inc.
18th & Vernor Highway
Detroit 16, Mich.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

LADLE LININGS—See REFRACTORIES

LEAD
Federated Metals Div.
American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

LEVEL INDICATORS (Bin)
Bin-Dicator Co.
13946 Kircheval
Detroit 15, Mich.

LIFT TRUCKS—See TRUCKS (Utility and Power Lift)

LINERS (Shot Blast Equipment)
Gates Rubber Co.
999 S. Broadway
Denver 17, Colo.
Pangborn Corporation
1400 Pangborn Blvd.
Hagerstown, Md.

LINSEED OIL
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Hercules Powder Co.
Wilmington 99, Del.

LITHIUM
Lithium Corp. of America
Rand Tower
Minneapolis, Minn.

LOADERS
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Clearfield Machine Co.
Clearfield, Pa.
Modern Equipment Co.
Port Washington, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.

LOADERS (Front-End)
Hough, Frank G., Co.
703 Sunnyside Ave.
Libertyville, Ill.
Tractomotive Corp.
Deerfield, Ill.
Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

LUBRICANTS (Industrial)
Acheson Colloids Co.
Port Huron, Mich.
Bellows Co.
230 W. Market St.
Akron 3, Ohio.
Cities Service Oil Co.
20 N. Wacker Dr.
Chicago 6, Ill.
New York & New Jersey Lubricant Co.
292 Madison Ave.
New York 17, N. Y.
Silicones Division
Union Carbide Corp.
40 E. 42nd St.
New York 17, N. Y.
Smith Oil & Refining Co.
1102 Kilburn Ave.
Rockford, Ill.
United States Graphite Co.
Saginaw, Mich.

MACHINE KEYS
Standard Horse Nail Corp.
New Brighton, Pa.

MAGNESIUM INGOTS
Federated Metals Division of American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

MAGNETIC PARTICLE TESTING
Magnaflux Corp.
7300 W. Lawrence Ave.
Chicago 31, Ill.

MANGANESE (Briquets)
Electro Metallurgical Co.
Div. Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metal Products,
303 W. 10th St.
New York 6, N. Y.

MATCHPLATE METAL
Federated Metals Division of American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

MATCHPLATES
Accurate Match Plate Co.
1847 W. Carroll St.
Chicago, Ill.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
City Pattern Foundry & Machine Co.
1165 Harper
Detroit 11, Mich.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.
Moltrup Steel Products Co.
Beaver Falls, Pa.
Scientific Cast Products Corp.
1388-92 E. 40th St.
Cleveland 3, Ohio.

MELTING POTS
Acme Foundry Co.
2503 22nd St.
Detroit 16, Mich.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.

METAL CLEANING—See BLAST CLEANING EQUIPMENT

METERS (Gas, Air, Water)
Illinois Testing Laboratories, Inc.
418 N. LaSalle St.
Chicago 10, Ill.

MIXERS (Core Wash)
Archer-Daniels-Midland Co.
Federal Foundry Supply Division,
2191 W. 110th St.
Cleveland 2, Ohio.

MOLD CONVEYORS—See CONVEYORS (Mold)

MOLD DRYERS
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

MOLD JACKETS
Adams Co.
Dubuque, Iowa.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Burr Aluminum Products
Burr Oak, Mich.
Chicago Mfg. & Distributing Co.
1928 W. 46th St.
Chicago 9, Ill.
Fremont Flask Co.
Fremont, Ohio.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.

MOLD OVENS—See CORE and MOLD OVENS

MOLD SEAL COMPOUND
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

MOLD WASH—See CORE and MOLD WASH

MOLDING MACHINES
Adams Co.
Dubuque, Iowa.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
British Moulding Machine Co. Ltd.
Faversham, Kent, England
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Eastern Clay Products Dept.
International Minerals & Chemicals Corp.
20 N. Wacker Drive
Chicago 6, Ill.
Foundry Equipment Ltd.
Leighton Buzzard
Bedfordshire, England.
Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburgh 22, Pa.
International Molding Machine Co.
LaGrange Park, Ill.
Johnston & Jennings Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Nichols, Wm. H., Co.
Richmond Hill
Long Island 18, N. Y.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
SPO Inc.
7500 Grand Division Ave.
Cleveland 25, Ohio.
Tabor Mfg. Co.
Div. Turbo Machine Co.
Lansdale, Pa.

MOLDING SANDS—See SAND

MOLYBDENUM and COMPOUNDS
Climax Molybdenum Co.
500 Fifth Ave.
New York 36, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

MONORAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

MOTORS (Electric)
Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago, Ill.

MULLERS—See SAND PREPARATION EQUIPMENT

NAILS (Chill)
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Standard Horse Nail Corp.
New Brighton, Pa.

NICKEL
Alloy Metal Products, Inc.
Rockingham Rd.
Davenport, Iowa.
International Nickel Co., Inc.
67 Wall St.
New York 5, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 6, N. Y.

NITROGEN—See GAS

NOZZLES (Blasting, Spray)
Alloy Metal Abrasives Co.
121 S. Division St.
Ann Arbor, Mich.
Archer-Daniels-Midland Co.
Federal Foundry Supply Division
2191 W. 110th St.
Cleveland 2, Ohio.
Carborundum Co.
Perth Amboy, N. J.
Norton Co.
Worcester 6, Mass.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Wheelabrator Corp.
505 S. Byrkit St.
Mishawaka, Ind.

OIL BURNERS—See BURNERS

OPEN HEARTH DOORS
Bailey, Wm. M., Co.
Pittsburgh 16, Pa.

OPTICAL PYROMETERS—See PYROMETERS

OVENS (Annealing and Heat Treating)—See FURNACES (Heat Treating and Annealing)

OVENS (Core)—See CORE and MOLD OVENS

OVENS (Enameling, Japanning)
Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.
Lanly Co.
2800 Euclid Ave.
Cleveland 15, Ohio.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
Mayer, Carl, Corp.
20800 Center Ridge Rd.
Cleveland 16, Ohio.

OVENS (Mold Drying)—See CORE and MOLD OVENS

OXYGEN—See GAS

PARTING COMPOUNDS
Acheson Colloids Co.
Port Huron, Mich.

Archer-Daniels-Midland Co.
Federal Foundry Supply Division
2191 W. 110th St.
Cleveland 2, Ohio.
Delta Oil Products Co.
6263 Cedarburg Rd.
Milwaukee 9, Wis.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
Silicones Division
Union Carbide Corp.
40 E. 42nd St.
New York 17, N. Y.
Smith Oil & Refining Co.
1102 Kilburn Ave.
Rockford, Ill.
Stevens, Frederic B., Inc.
18th & Vernor Highway
Detroit 16, Mich.
Superior Graphite Co.
33 S. Clark St.
Chicago 3, Ill.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

PATTERN COATINGS

Acheson Colloids Co.
Port Huron, Mich.
National Chemical & Plastics Co.
1424 Philpot St.
Baltimore 31, Md.

PATTERN COMPOUND

Acheson Colloids Co.
Port Huron, Mich.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.

PATTERN DRAW MACHINES

The Adams Co.
Dubuque, Iowa.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
International Molding Machine Co.
LaGrange Park, Ill.
Tabor Mfg. Co.
Div. Turbo Machine Co.
Lansdale, Pa.

PATTERN METAL

Federated Metals Division of American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

PATTERN PLATES—See PATTERNS and PATTERN PLATES (Wood, Metal, Plastic)

PATTERN SHOP EQUIPMENT

Oliver Machinery Company
Grand Rapids 1, Mich.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.

PATTERNS and PATTERN PLATES (Wood, Metal, Plastic)

Accurate Match Plate Co.
1847 W. Carroll St.
Chicago, Ill.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
City Pattern Foundry & Machine Co.
1165 Harper
Detroit 11, Mich.
Hines Flask Co.
3431 W. 140th St.
Cleveland 11, Ohio.
Moltrup Steel Products Co.
Beaver Falls, Pa.
Scientific Cast Products Corp.
1388-92 E. 40th St.
Cleveland 3, Ohio.
Sheil Process Inc.
Bliss & Parkside St.
West Springfield, Mass.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

PERMANENT MOLDS

Centrifugal Casting Machine Co.
Tulsa, Okla.
Great Lakes Carbon Corp.
18 E. 48th St.
New York 17, N. Y.
National Carbon Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.

PHOSPHOR COPPER

Federated Metals Division of American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

PHOTOGRAPHIC EQUIPMENT

Eastman Kodak Co.
Rochester, N. Y.

PIG CASTING MACHINES

Bailey, Wm., Co.
Pittsburgh 16, Pa.

PIG IRON

Hanna Furnace Corp.
Ecorse, Detroit 29, Mich.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Keokuk Electro Metals Co.
320 Concert St.
Keokuk, Iowa.
Miller & Company
332 S. Michigan Ave.
Chicago 4, Ill.
Pickands, Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Pittsburgh Coke & Chemical Co.
Grant Building
Pittsburgh 19, Pa.
Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.
Woodward Iron Co.
Woodward, Ala.

PIG IRON (Silvery)

Hanna Furnace Corp.
Ecorse, Detroit 29, Mich.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Keokuk Electro Metals Co.
320 Concert St.
Keokuk, Iowa.
Miller & Company
332 S. Michigan Ave.
Chicago 4, Ill.
Pickands, Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.

PIG IRON (Spiegeleisen)

Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.

PINS (Flask)—See FLASK BUSHINGS, PINS and FITTINGS

PITCH—See COREBINDERS (Pitch)

PLUMBAGO—See GRAPHITE and GRAPHITE BRIQUETS

PNEUMATIC TOOLS and CHISELS

Airetool Mfg. Co.
Springfield, Ohio.
Chicago Mfg. & Distributing Co.
1928 W. 46th St.
Chicago 9, Ill.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Combined Supply & Equipment Co., Inc.
215 Chandler St.
Buffalo 7, N. Y.
Dayton Pneumatic Tool Co.
Dayton 1, Ohio.
Dotmar Industries, Inc.
502 Hanselman Bldg.
Kalamazoo, Mich.
Gardner-Denver Co.
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.
Joy Mfg. Co.
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.
Master Pneumatic Tool Co., Inc.
13 Krick Rd.
Bedford, Ohio.

POURING DEVICES

Bartlett & Snow, C. O., Co.
(Grindle Division)
6201 Harvard Ave.
Cleveland 5, Ohio.
Cleveland Tramrail Div.
Cleveland Crane & Engineering Co.
Wickliffe, Ohio.
Industrial Equipment Co.
Minster, Ohio.
Modern Equipment Co.
Port Washington, Wis.
Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

POWER GENERATOR

Allis-Chalmers Mfg. Co.
Engine-Material Handling Div.
1123 S. 70th St.
Milwaukee 14, Wis.
Ready Power Co.
3826 Grand River Ave.
Detroit 8, Mich.

PRESSER BOARDS

Adams Co.
Dubuque, Iowa.
Chicago Mfg. & Distributing Co.
1928 W. 46th St.
Chicago 9, Ill.

PRESSURE RECORDERS

Foxboro Company
Foxboro, Mass.

PULLEYS (Magnetic)—See SEPARATORS (Magnetic)

PUMPS

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Gardner-Denver Co.
Quincy, Ill.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.

PUMPS (Dry, Vacuum)

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Fuller Company
Catasauqua, Pa.
Ingersoll-Rand Co.
11 Broadway
New York 4, N. Y.

PUSH-OFF MACHINES—See PATTERN DRAW MACHINES

PUTTY (Foundry)

Archer-Daniels-Midland Co.
Federal Foundry Supply Division
2191 W. 110th St.
Cleveland 2, Ohio.

PYROMETERS

Foxboro Company
Foxboro, Mass.
Gordon, Claud S., Co.
3000 S. Wallace
Chicago 16, Ill.
Illinois Testing Laboratories, Inc.
418 N. LaSalle St.
Chicago 10, Ill.
Leeds & Northrup
4901 Stenton Ave.
Philadelphia 44, Pa.
Marshall Co., L. H.
270 W. Lane
Columbus 2, Ohio.
Minneapolis-Honeywell Co.
Wayne and Windrim Avenues
Philadelphia 44, Pa.
Pyrometer Instrument Co.
Bergenfield, N. J.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.

RACKS (Core Oven)

Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.
Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.

RADIOGRAPHY (Industrial)

Budd Co.
Industrial Systems Div.
2950 Roberts Ave.
Philadelphia 29, Pa.
Eastman Kodak Co.
Rochester, N. Y.
Picker X-Ray Corp.
25 S. Broadway
White Plains 10, N. Y.
Westinghouse Electric Corp.
2519 Wilkens Ave.
Baltimore 3, Md.

REFRACTORIES (Firebrick, Fire Clay, Fire Sand, Fire Stone)

Ajax Electrothermic Corp.
Ajax Park
Trenton, N. J.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Babcock & Wilcox Co.
161 42nd St.
New York 17, N. Y.
Campbell-Hausfeld Co.
Harrison, Ohio.
Carborundum Co.
Niagara Falls, N. Y.
Carborundum Co.
Perth Amboy, N. J.
Cedar Heights Clay Co.
Oak Hill, Ohio.
Cement Gun Co.
1520 Walnut St.
Allentown, Pa.
Denver Fire Clay Co.
2301 Blake St.
Denver 2, Colo.
Eastern Clay Products Dept.
International Minerals & Chemical Corp.
20 N. Wacker Drive
Chicago 6, Ill.
Great Lakes Carbon Co.
18 E. 48th St.
New York 17, N. Y.
A. P. Green Fire Brick Co.
Mexico, Mo.
Harbison-Walker Refractories Co.
307 Fifth Ave.
Pittsburgh 22, Pa.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Inductotherm Corp.
412 Illinois Ave.
Delanco, N. J.
Ironton Fire Brick Co.
Ironton, Ohio.
Johns-Manville
22 E. 40th St.
New York 16, N. Y.
Keystone Refractories Co.
120 Liberty St.
New York 6, N. Y.
Lindberg Engineering Co.
Fisher Furnace Div.
2450 W. Hubbard
Chicago 12, Ill.
National Carbon Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.
North American Refractories Co.
National City Bank Bldg.
Cleveland 14, Ohio.
Norton Co.
Worcester 6, Mass.
Stevens, Frederic B., Inc.
18th St. & Vernor Highway
Detroit 16, Mich.
Stroman Furnace & Engineering Co.
Div. of Petersen Oven Co.
9900 Franklin Ave.
Franklin Park, Ill.
Chas. Taylor Sons Co.
710 Burns St.
Cincinnati 4, Ohio.
United States Graphite Co.
Saginaw, Mich.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

REFRACTORY GUNS

Cement Gun Co.
1520 Walnut St.
Allentown, Pa.
Eastern Clay Products Dept.
International Minerals & Chemicals Corp.
20 N. Wacker Drive
Chicago 6, Ill.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.

RELEASE AGENTS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
Silicones Division
Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.

RESIN—See CORE BINDERS (Resin)

RESPIRATORS

American Optical Co.
Southbridge, Mass.
Pangborn Corporation
1400 Pangborn Blvd.
Hagerstown, Md.

RIDDLES (Electric)

Archer-Daniels-Midland Co.
Federal Foundry Supply Division
2191 W. 110th St.
Cleveland 2, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Foundry Supplies & Mfg. Co.
2221 Orchard St.
Chicago 14, Ill.
Great Western Mfg. Co.
Leavenworth, Kans.

RIDDLES (Hand)

Archer-Daniels-Midland Co.
Federal Foundry Supply Division
2191 W. 110th St.
Cleveland 2, Ohio.
Great Western Mfg. Co.
Leavenworth, Kans.
Stevens, Frederic B., Inc.
18th St. & Vernor Highway,
Detroit 16, Mich.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

RISER COMPOUNDS

Foundry Services Inc.
1045 S. High St.
Columbus 6, Ohio.
Pittsburgh Metals Purifying Co.
P.O. Box 568
Mars, Pa.
United States Graphite Co.
Saginaw, Mich.

ROD STRAIGHTENERS—See CORE ROD STRAIGHTENING and CUTTING MACHINERY

ROLLER-HEARTH—See FURNACES (Heat Treating and Annealing)

RUBBER LINING MATERIAL

(Abrasive Resisting)
Goodrich, B. F., Co.
Akron 18, Ohio.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Quaker Rubber Div.
H. K. Porter Company, Inc.
Tacony & Comly Streets
Philadelphia 24, Pa.

SAFETY EQUIPMENT

American Optical Co.
Southbridge, Mass.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Quaker Rubber Div.
H. K. Porter Company, Inc.
Tacony & Comly Streets
Philadelphia 24, Pa.
United States Rubber Co.
1230 Ave. of the Americas
New York 20, N. Y.

SAND (Core, Molding, Blasting)

Harbison-Walker Refractories Co.
307 Fifth Ave.
Pittsburgh 22, Pa.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Orefraction Inc.
7425 Thomas St.
Pittsburgh 8, Pa.
Ottawa Silica Co.
Ottawa, Ill.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Pennsylvania Glass Sand Corp.
140 Stanwix St.
Pittsburgh 22, Pa.
Standard Silica Co.
Ottawa, Ill.
Wedron Silica Co.
135 S. LaSalle St.
Chicago 3, Ill.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

SAND BLAST BARRELS—See BLAST CLEANING EQUIPMENT

SAND BLAST EQUIPMENT—See BLAST CLEANING EQUIPMENT

SAND BLAST NOZZLES—See NOZZLES (Blasting)

SAND BLAST ROOMS—See BLAST CLEANING EQUIPMENT

SAND BLAST TABLES—See BLAST CLEANING EQUIPMENT

SAND CONTROL and TESTING EQUIPMENT

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
Gordon, Claud S., Co.
3000 S. Wallace
Chicago 16, Ill.
Great Western Mfg. Co.
Leavenworth, Kans.
Hartley Controls Corp.
P.O. Box 290
Neenah, Wis.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.

SAND DRYERS

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
DeVilbiss Metal Fabricators Co.
17900 Ryan Rd.
Detroit 12, Mich.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Nichols Engineering & Research Corp.
70 Pine St.
New York 5, N. Y.

SANDING MACHINERY (Disc, Spindle, Belt, etc.)

Oliver Machinery Company
Grand Rapids 1, Mich.

SAND MEASURING and WEIGHING DEVICES

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.

SAND MIXERS—See SAND PREPARATION EQUIPMENT

SAND PREPARATION EQUIPMENT

Ajax Flexible Coupling Co. Inc.
Westfield, N. Y.
Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.
American Air Filter Co.
226 Central Ave.
Louisville 8, Ky.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Carrier Conveyor Corp.
211 N. Jackson St.
Louisville 2, Ky.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa
Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Clearfield Machine Co.
Clearfield, Pa.
Cleveland Tramrail Div.
Cleveland Crane & Engineering Co.
Wickliffe, Ohio.
Deister Concentrator Co.
901 Glasgow Ave.
Ft. Wayne, Ind.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.
Foundry Equipment Ltd.
Leighton Buzzard
Bedfordshire, England
Foundry Supplies & Mfg. Co.
2221 Orchard St.
Chicago 14, Ill.
Goodrich, B. F., Co.
Akron 18, Ohio.
Great Western Mfg. Co.
Leavenworth, Kans.
Hartley Controls Corp.
P.O. Box 290
Neenah, Wis.
International Automation Corp.
Ann Arbor, Mich.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Newaygo Engineering Co.
Newaygo, Mich.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
Pekay Machine & Engineering Co.
865 N. Sangamon St.
Chicago 22, Ill.
Planet Corp.
1820 Sunset
Lansing 6, Mich.
Royer Foundry & Machine Co.
Kingston, Pa.
States Engineering Corp.
922 W. Berry
Ft. Wayne 2, Ind.
U. S. Forge & Foundry Co.
Pulaski, N. Y.
Webster Mfg. Co.
Tiffin, Ohio
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.
Wheelabrator Corp.
Mishawaka, Ind.

SAND RAMMERS

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Chicago Mfg. & Distributing Co.
1928 W. 46th St.
Chicago 9, Ill.
Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Dayton Pneumatic Tool Co.
Dayton 1, Ohio.
Ingersoll Rand Co.
11 Broadway
New York 4, N. Y.
Master Pneumatic Tool Co., Inc.
13 Krick Rd.
Bedford, Ohio.

SAND RECLAIMERS

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Deister Concentrator Co.
901 Glasgow Ave.
Ft. Wayne, Ind.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Nichols Engineering & Research Corp.
70 Pine St.
New York 5, N. Y.

SAND SIFTING and SCRENING MACHINERY—See SAND PREPARATION EQUIPMENT

SAND STABILIZER

Archer-Daniels-Midland Co.
Federal Foundry Supply Division
2191 W. 110th St.
Cleveland 2, Ohio.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
Reichhold Chemicals, Inc.
525 N. Broadway
White Plains, N. Y.

SAND STORAGE (Bins, Hoppers, Silos)

American Bridge Div.
United States Steel Corp.
525 Wm. Penn Place,
Pittsburgh 19, Pa.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Marietta Concrete Corp.
Marietta, Ohio.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Neff & Fry Co.
Camden, Ohio.
Newaygo Engineering Co.
Newaygo, Mich.
Planet Corp.
1820 Sunset
Lansing 6, Mich.
Webster Mfg. Co.
Tiffin, Ohio
Westover Corp.
Nomad Equipment Div.
3110 W. Fond du Lac Ave.
Milwaukee 10, Wis.

SAWS (Band, Metal, Wood and Saw Accessories)

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.
Oliver Machinery Co.
Grand Rapids 1, Mich.

SCALING HAMMERS—See PNEUMATIC TOOLS and CHISELS

SCREENS (Shakeout and Vibrating)

Ajax Flexible Coupling Co., Inc.
Westfield, N. Y.
Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Carrier Conveyor Corp.
211 N. Jackson St.
Louisville 2, Ky.
Deister Concentrator Co.
901 Glasgow Ave.
Ft. Wayne, Ind.
Great Western Mfg. Co.
Leavenworth, Kans.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.

SEA COAL

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Penn-Rilton Co.
324 W. 23rd St.
New York 11, N. Y.
Stevens, Frederic B., Inc.
18th & Vernor Highway
Detroit 16, Mich.
Thiem Products Co.
9800 W. Rogers
Milwaukee 14, Wis.
Whitehead Bros. Co.
324 W. 23rd St.
New York 11, N. Y.

SEPARATORS (Air, Moisture, Oil)

American Air Filter Co.
226 Central Ave.
Louisville 8, Ky.
Bellows Co.
230 W. Market St.
Akron 3, Ohio.
Chicago Mfg. & Distributing Co.
1928 W. 46th St.
Chicago 9, Ill.
James A. Murphy & Co.
Hamilton, Ohio.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Wheelabrator Corp.
Mishawaka, Ind.

SEPARATORS (Magnetic)

Ajax Flexible Coupling Co. Inc.
Westfield, N. Y.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.

SHAKEOUT MACHINERY

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.
American Air Filter Co.
226 Central Ave.
Louisville 8, Ky.
Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
The Branford Co.
130 Chestnut St.
New Haven 7, Conn.
Jeffrey Mfg. Co.
907 N. Fourth St.
Columbus 16, Ohio.
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
Planet Corp.
1820 Sunset
Lansing 6, Mich.
Rover Foundry & Machine Co.
Kingston, Pa.
Simplicity Engineering Co.
Durand, Mich.

SHELL MOLDING (Equipment and Accessories)

Bartlett & Snow, C. O., Co.
6201 Harvard Ave.
Cleveland 5, Ohio.
Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
C & S Products Co.
18656 Fitzpatrick Ave.
Detroit 28, Mich.
Centrifugal Casting Machine Co.
Tulsa, Okla.
Demmler Mfg. Co.
Kewanee, Ill.
Dependable Pattern Works
1634 S. E. Seventh Ave.
Portland 14, Oreg.
Foundry Equipment Ltd.
Leighton Buzzard
Bedfordshire, England
Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.
National Engineering Co.
549 W. Washington St.
Chicago 6, Ill.
Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.
SPO, Inc.
Grand Division Ave.
Cleveland 25, Ohio.
Shell Process Inc.
Bliss & Parkside Sts.
West Springfield, Mass.

SHELL MOLD SAND (Coated)

Acme Resin Corp.
1401 Circle Ave.
Forest Park, Ill.

SHELL MOLDS—See CORE BINDERS (Resin)

SHOT and GRIT

Abrasive Shot and Grit Co.
Springville, N. Y.
Alloy Metal Abrasive Co.
121 S. Division St.
Ann Arbor, Mich.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Carborundum Co.
Niagara Falls, N. Y.
Cleveland Metal Abrasive Co.
887 E. 67th St.
Cleveland, Ohio.
Globe Steel Abrasive Co.
Mansfield, Ohio.
Hickman Williams & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Macklin Co.
Jackson, Mich.
Metal Blast, Inc.
871 E. 67th St.
Cleveland, Ohio.
National Metal Abrasive Co.
3560 Norton Ave.
Cleveland 7, Ohio.
Norton Co.
Worcester 6, Mass.
Pangborn Corp.
1400 Pangborn Blvd.
Hagerstown, Md.
Simonds Abrasive Co.
Tacony & Fraley Sts.
Philadelphia 37, Pa.
Wheelabrator Corp.
Mishawaka, Ind.

SHOT (Peening)—See SHOT and GRIT

SHOVELS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Stevens, Frederic B., Inc.
18th St. & Vernor Highway
Detroit 16, Mich.

SHOVELS (Power)

Hough, Frank G., Co.
703 Sunnyside Ave.
Libertyville, Ill.

SILICA FLOUR

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Ottawa Silica Co.
Ottawa, Ill.
Pennsylvania Pulverizing Co.
140 Stanwix St.
Pittsburgh 22, Pa.
Standard Silica Co.
Ottawa, Ill.
Wedron Silica Co.
135 S. LaSalle St.
Chicago 3, Ill.

SILICOMANGANESE

Electro Metallurgical Co.
Div. Union Carbide Corp.
30 East 42nd St.
New York 17, N. Y.
Pickands, Mather & Co.
Union Commerce Bldg.
Cleveland 14, Ohio.
Vanadium Corp. of America,
420 Lexington Ave.
New York, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

SILICON (Briquets)

Electro Metallurgical Co.
Div. Union Carbide Corp.
535 Fifth Ave.
New York 17, N. Y.
Ohio Ferro Alloys Corp.
Canton 9, Ohio.
Vanadium Corp. of America
420 Lexington Ave.
New York, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

SILICON CARBIDE (Briquets)

Ohio Ferro Alloys Corp.
Canton 9, Ohio.

SILVERY PIG IRON—See PIG IRON (Silvery)

SKIMMERS

Chicago Mfg. & Distributing Co.
1928 W. 46th St.
Chicago 9, Ill.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.

SLINGS (Chain)—See CHAIN

SLIP FLASKS—See FLASKS (Slip)

SLIP JACKETS—See MOLD JACKETS

SMELTERS and REFINERS

Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

SNAGGING MACHINES—See GRINDERS

SNAGGING WHEELS—See GRINDING WHEELS

SNAP FLASKS—See FLASKS (Snap)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.

SODA ASH

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Columbia-Southern Chemical Corp.
Div., Pittsburgh Plate Glass Co.
Pittsburgh 19, Pa.
Diamond Alkali Co.
300 Union Commerce Bldg.
Cleveland 14, Ohio.
Hercules Powder Co.
Wilmington 99, Del.
Olin Mathieson Chemical Corp.
Mathieson Bldg.
Baltimore 3, Md.

SOLDER

Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.
Whitehead Metal Products
303 W. 10th St.
New York 14, N. Y.

SPECTROGRAPHIC ANALYSIS (Equipment and Materials)

Baird-Atomic, Inc.
33 University Rd.
Cambridge 38, Mass.
Spectrochemical Laboratories, Inc.
8350 Frankstown Ave.
Pittsburgh 20, Pa.

SPEED REDUCERS

Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.

SPRAY GUNS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
The Branford Co.
130 Chestnut St.
New Haven 7, Conn.
Foundry Services, Inc.
1045 S. High St.
Columbus 6, Ohio.
James A. Murphy & Co.
Hamilton, Ohio.

SPRUE CUTTERS

Adams Co.
Dubuque, Iowa.
Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.
Milwaukee Chaplet & Mfg. Co.
1023 S. 40th St.
Milwaukee, Wis.
Rice Pump & Machine Co.
Belgium, Wis.

STEEL SHELVING (Pre Fabricated)

Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio

STEEL SHOT—See SHOT and GRIT

STEEL (Structural)

American Bridge Div.
United States Steel Corp.
52 S. Wm. Penn Pl.
Pittsburgh 19, Pa.

STRAINER CORES—See CORES (Strainer, Riser, Breakoff)

STRIPPING MACHINES—See PATTERN DRAW MACHINES

TABLES

Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.

TELLURIUM

American Smelting & Refining Co.
120 Broadway
New York 5, N. Y.

TEMPERATURE CONTROLLERS

Foxboro Co.
Foxboro, Mass.
Illinois Testing Laboratories, Inc.
418 N. LaSalle St.
Chicago 10, Ill.
Leeds & Northrup
4901 Stenton Ave.
Philadelphia 44, Pa.
Marshall Co., L. H.
270 W. Lane
Columbus 2, Ohio.
Minneapolis-Honeywell Co.
Wayne and Windrim Aves.
Philadelphia 44, Pa.

TENSILE TESTING MACHINES

Detroit Testing Machine Co.
19390 Grinnell Ave.
Detroit 13, Mich.
Dietert, Harry W., Co.
9330A Roselawn Ave.
Detroit 4, Mich.

TESTING EQUIPMENT—See Type of Test

THERMOCOUPLES

Gordon, Claud S., Co.
3000 S. Wallace
Chicago 16, Ill.
Illinois Testing Laboratories, Inc.
418 N. LaSalle St.
Chicago 10, Ill.
Leeds & Northrup
4901 Stenton Ave.
Philadelphia 44, Pa.
Marshall Co., L. H.
270 W. Lane
Columbus 2, Ohio.
Minneapolis-Honeywell Regulator Co.
Wayne and Windrim Aves.
Philadelphia 44, Pa.
Pyrometer Instrument Co.
Bergenfield, N. J.
Tamms Industries Co.
228 N. LaSalle St.
Chicago 1, Ill.

TILE (Gate)

Louthan Corp.
East Liverpool, Ohio.

TIMERS (Electric)

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.
Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.
Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburgh 22, Pa.

TIN

Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

TIRES (Industrial)

Mitchell Industrial Tire Co.
1400 E. 40th St.
Chattanooga 7, Tenn.

United States Rubber Co.
1230 Ave. of Americas
New York 20, N. Y.

TONGS

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.

Industrial Equipment Co.
Minster, Ohio.

TORCHES and BURNERS (Acetylene, Gas, Oil)

Johnston Mfg. Co.
2825 E. Hennepin Ave.
Minneapolis 13, Minn.

Linde Co., Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.

Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

TORCHES (Metal Removal)

Arcair Co.
465 South Mt. Pleasant Ave.
Lancaster, Ohio

TOTE BOXES—See BOXES (Stacking, Tote)

TRACTORS—See TRUCKS (Utility and Power Lift)

TRAMRAIL SYSTEMS—See CONVEYORS (Overhead Monorail)

TRAPS (Air)

Murphy, Jas. A., & Co.
Hamilton, Ohio.

TROLLEYS

Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.

Modern Equipment Co.
Port Washington, Wis.

Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

TRUCK CRANES

Elwell-Parker Electric Co.
4205 St. Clair Ave.
Cleveland 3, Ohio.

TRUCKS (Core)

Allis-Chalmers Mfg. Co.
Engine-Material Handling Div.
1123 S. 70th St.
Milwaukee 14, Wis.

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.

Buda Div., Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.

Chicago Mfg. & Distributing Co.
1928 W. 46th St.
Chicago 9, Ill.

Foundry Equipment Co.
1831 Columbus Rd.
Cleveland 13, Ohio.

Kirk & Blum Mfg. Co.
3108 Forrer St.
Cincinnati 9, Ohio.

Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.

TRUCKS (Utility and Power Lift)

Allis-Chalmers Mfg. Co.
Engine-Material Handling Div.
1123 S. 70th St.
Milwaukee 14, Wis.

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.

Buda Div., Allis-Chalmers Mfg. Co.
1123 S. 70th St.
Milwaukee 14, Wis.

Chicago Mfg. & Distributing Co.
1928 W. 46th St.
Chicago 9, Ill.

Elwell-Parker Electric Co.
4205 St. Clair Ave.
Cleveland 3, Ohio.

Hough, Frank G., Co.
703 Sunnyside Ave.
Libertyville, Ill.

Kwik-Mix Co.
3026 W. Concordia
Milwaukee 16, Wis.

Ready Power Co.
3826 Grand River Ave.
Detroit 8, Mich.

Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.

Tractomotive Corp.
Deerfield, Ill.

Yale & Towne Mfg. Co.
11000 Roosevelt Blvd.
Philadelphia 15, Pa.

TUMBLING BARRELS

United States Rubber Co.
1230 Ave. of the Americas
New York 20, N. Y.

Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

TUMBLING STARS

Quincy Foundry Inc.
Quincy, Ohio.

TURNTABLES

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.

Modern Equipment Co.
Port Washington, Wis.

Newaygo Engineering Co.
Newaygo, Mich.

Whiting Corp.
15607 Lathrop Ave.
Harvey, Ill.

UNLOADERS (Car)

Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.

VACUUM CLEANERS

Spencer Turbine Co.
Hartford, Conn.

VACUUM DEGASSING EQUIPMENT

Centrifugal Casting Machine Co.
Tulsa, Okla.

VALVES (Gas, Oil, Water, Steam)

Bellows Co.
230 W. Market St.
Akron 3, Ohio.

Galland-Henning Mfg. Co.
2753 S. 31st St.
Milwaukee 46, Wis.

Hunt, C. B., & Son Inc.
Salem, Ohio.

Linde Co., Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.

Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

VALVES (Blow-off and Cut-off)

Bellows Co.
230 W. Market St.
Akron 3, Ohio.

Champion Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.

Galland-Henning Mfg. Co.
2753 S. 31st St.
Milwaukee 46, Wis.

Hunt, C. B., & Son Inc.
Salem, Ohio.

VENTILATING—See DUST COLLECTING, VENTILATING, EXHAUST, COOLING SYSTEMS

VENTS (Corebox)

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.

Carver Foundry Products Co.
1056 Hershey Ave.
Muscatine, Iowa.

Demmler Mfg. Co.
Kewanee, Ill.

Smillie, C. M., & Co.
1124 Woodward Hgts. Blvd.
Ferndale 20, Mich.

VIBRATORS

Adams Co.
Dubuque, Iowa.

Beardsley & Piper Div.
Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Ill.

Branford Co., The
130 Chestnut St.
New Haven 7, Conn.

Chicago Pneumatic Tool Co.
6 E. 44th St.
New York 17, N. Y.

Cleveland Vibrator Co.
2828 Clinton Ave., W.
Cleveland 13, Ohio.

Foundry Supplies & Mfg. Co.
2221 Orchard St.
Chicago 14, Ill.

Herman Pneumatic Machine Co.
Union Bank Bldg.
Pittsburgh 22, Pa.

International Molding Machine Co.
LaGrange Park, Ill.

Link-Belt Co.
Dept. 1058-FWTB
Prudential Plaza
Chicago 1, Ill.

Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.

SPO, Inc.
7500 Grand Division Ave.
Cleveland 25, Ohio.

Stevens, Frederic B., Inc.
18th St. & Vernor Highway
Detroit 16, Mich.

Tabor Mfg. Co.
Div. Turbo Machine Co.
Lansdale, Pa.

VISES (Hydraulic, Mechanical, etc.)

Desmond-Stephan Mfg. Co.
Urbana, Ohio.

WASHES—See CORE and MOLD WASH

WEDGES (Foundry)

Adams Co.
Dubuque, Iowa.

Chicago Mfg. & Distributing Co.
1928 W. 46th St.
Chicago 9, Ill.

WELDING APPARATUS (Electric Arc, Inert Gas)

Harnischfeger Corp.
4400 W. National Ave.
Milwaukee 46, Wis.

Linde Co., Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.

Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

WELDING APPARATUS and SUPPLIES

Hoeganaes Sponge Iron Corp.
Riverton, N. J.

Linde Co., Div. Union Carbide Corp.
420 Lexington Ave.
New York 17, N. Y.

Liquid Carbonic Div.
General Dynamics Corp.
135 S. LaSalle St.
Chicago 3, Ill.

WELDING ELECTRODES (Carbon)

United States Graphite Co.
Saginaw, Mich.

WELDING GAS—See GAS

WHEELBARROWS

Sterling National Industries, Inc.
7036 W. Walker St.
Milwaukee 14, Wis.

WHEELS (Abrasive Contact)

Chicago Rubber Co.
Waukegan, Ill.

WHEELS (Wire Brush)

Osborn Mfg. Co.
5401 Hamilton Ave.
Cleveland 14, Ohio.

WIRE CUTTERS

Archer-Daniels-Midland Co.
Federal Foundry Supply Division
2191 W. 110th St.
Cleveland 2, Ohio.

WIRE NAILS

Republic Steel Corp.
Republic Bldg.
Cleveland 1, Ohio.

WIRE ROPE

American Chain & Cable Co., Inc.
271 S. Pennsylvania Ave.
Wilkes-Barre, Pa.

WOOD FLOUR

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.

Eastern Clay Products Dept.
International Minerals & Chemical Corp.
20 N. Wacker Dr.
Chicago 6, Ill.

Wilner Wood Products Co.
Norway, Maine.

WOODWORKING MACHINERY

Oliver Machinery Co.
Grand Rapids 1, Mich.

X-RAY EQUIPMENT

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.

Ansco Co.
171 Clinton St.
Binghampton, N. Y.

Westinghouse Electric Corp.
2519 Wilkens Ave.
Baltimore 3, Md.

Picker X-Ray Corp.
25 S. Broadway
White Plains, N. Y.

X-RAY FILM and ACCESSORIES

Ansco Co.
171 Clinton St.
Binghampton, N. Y.

Eastman Kodak Co.
Rochester, N. Y.

Westinghouse Electric Corp.
2519 Wilkens Ave.
Baltimore 3, Md.

Picker X-Ray Corp.
25 S. Broadway
White Plains, N. Y.

ZINC

Federated Metals Div., American Smelting and Refining Co.
120 Broadway
New York 5, N. Y.

ZIRCON SAND

Archer-Daniels-Midland Co.
Federal Foundry Supply Div.
2191 W. 110th St.
Cleveland 2, Ohio.

Berkshire Chemicals, Inc.
420 Lexington Ave.
New York 17, N. Y.

Orefraction Inc.
7425 Thomas St.
Pittsburgh 8, Pa.

ZIRCONIUM ALLOYS

Electro Metallurgical Co.
Div. Union Carbide Corp.
30 E. 42nd St.
New York 17, N. Y.

Think carefully: Have you seen this man anywhere around your plant?

His name is WILLIS JOSEPH HAMILTON, and he's

WANTED FOR MURDER

WILLIS JOSEPH HAMILTON is being sought by the FBI for unlawful flight to avoid prosecution for the crime of murder. Hamilton has been employed in foundries and by manufacturers of steel products, and may seek employment or already be employed in such industries.

On June 26, 1953, Hamilton is alleged to have shot and killed one William H. Goolsby in a Cleveland, Ohio, restaurant following an argument over the payment of a check. A complaint was filed before a U.S. Commissioner at Cleveland, Ohio, June 29, 1953, charging Hamilton with a violation of Title 18, U.S. Code, Section 1073, in that he fled from the State of Ohio to avoid prosecution for the crime of murder.

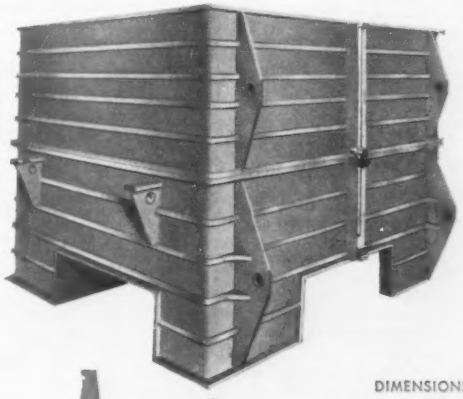
Hamilton uses several aliases: Joe Brown, Thomas Collins, Jimmie Dale, Willie Foster, William Hamilton, Willie Hamilton, John Tabot, Joe Talbert, John Talbert, Joseph J. White, James Williams, John Williams, Joseph Whyte, Joe Whyth.

This fugitive has escaped from confinement on numerous occasions. He reportedly carries a .45 caliber automatic under his left shoulder in a shoulder holster. He reportedly practices drawing this automatic while pretending to reach for cigarets. He reportedly has another automatic pistol in his possession. Accordingly, he should be considered armed and dangerous. Hamilton has been convicted for robbery, highway robbery, armed robbery, and breaking and entering to commit a misdemeanor. Fugitive was born April 16, 1902, St. Augustine, Florida; height, 5'7"; weight, 160 lbs.; build, medium; hair, black graying, kinky; eyes, brown; complexion, medium brown; race, Negro; nationality, American. Occupations, laborer, steel foundry worker, chauffeur. Scars and marks: small cut scar running into and above right eye; small cut scar above left eye; cut scar right edge of nose; 1" scar left side of face near ear. Has several gold-capped teeth, large vaccination outside upper left arm, large cut scar on back of right hand near base of index finger. Hamilton is said to drink to excess and has an ungovernable temper. He is an accomplished trumpet player and occasionally wears a mustache.

Any person having information which might assist in locating this fugitive is requested to immediately notify the Director of the Federal Bureau of Investigation, United States Department of Justice, Washington 25, D. C., or the SPECIAL AGENT IN CHARGE OF THE NEAREST FBI DIVISION. . . . the telephone number is on the first page of your local telephone directory.

This space contributed by FOUNDRY as a public service.

ONE OF THE LARGEST EVER BUILT...



DIMENSIONS:
90" x 103"
Cope 42"
Drag 36"

by American...

OF COURSE

A division of Cromb & Gagel, Inc.

Specially designed for a large eastern foundry, this heavy duty flask is one example of the close cooperation between our experienced engineering department and our customer-foundry.

The heavy duty flask shown above has ½" walls, special heavy bearings and reinforcements and lifting loops and brackets. Cutouts for core installations are heavily reinforced.

We'll be glad to place our flask engineering and designing experience at your complete disposal and make quotations on your flask requirements.

Send today for our 1958, 24 page Catalog G

affco

AMERICAN FOUNDRY FLASK CO.

2745 SOUTHWEST BLVD., KANSAS CITY, MO.

CLASSIFIED ADVERTISING

Help Wanted

FOUNDRY SALES SPECIALIST

Well established AAA1 South Central Foundry with up-to-date equipment—producer of gray and nodular irons—has excellent opportunity for the RIGHT man. He must be a successful foundry salesman with imagination and have no fear of hard work. If you feel you are this man, write us sending full resume and financial requirements. Reply to:

BOX 206, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

STEEL FOUNDRYMAN

Capable of improving operations and quality of castings produced.
Unusual opportunity for an ambitious man with good supervisory ability, if he can qualify. We operate an electric steel foundry, about 350 ton capacity, located in central Ohio.
Give particulars of age, education, family status, and if available, late picture in first letter. All correspondence will be confidential and qualified men will be interviewed.
If interested, write:

BOX 207, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY CONSULTANT

Technical and experienced in glass mold cast gray iron. Preferably available to spend one or two months in Monterrey, Mexico.

FABRICACION DE MAQUINAS, S.A.
APARTADO POSTAL #656
MONTERREY, MEXICO

FOREMAN, SMALL NONFERROUS JOB SHOP

Must assume complete authority and responsibility of and for all production and production facilities. 85% aluminum, 15% brass, 90% matchplate work. Prefer someone to invest small amount and increase holdings and earnings through production bonus. Send recent photo with complete work history and other references. Address: Box 212, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

DIRECTOR OF QUALITY CONTROL

Long established medium sized gray iron foundry in midwest. Must be graduate metallurgist familiar with casting defects, cupola practice and sand control. Address: Box 230, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Nonferrous metallurgist wanted to work in aluminum foundry. Must be versatile and have well rounded experience. Address: HAMPDEN BRASS & ALUMINUM COMPANY, 262 LIBERTY ST., SPRINGFIELD, MASS.

FOREMEN

Detroit area Aluminum Foundry running superior quality work interested in good Core Room Foreman, Foundry Foreman and/or General Foreman with proven record in production and discipline. Address: Box 225, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Man between 30-50 years of age that knows centrifugal casting work and all types of nonferrous castings. Will give good man chance to split profits. Also sell some stock if proven to be successful. Address: Box 203, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PULL OVER LINE FOREMAN

Fully mechanized eastern foundry requires foreman to supervise eight station rollover line. Send resume. Address: Box 226, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Long-established gray iron jobbing foundry in Michigan requires a general foundry superintendent. Prior experience as superintendent required. Excellent opportunity for right man. Send complete resume.

BOX 193, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOREMAN

Steel foundry cleaning department. Must have a thorough knowledge of the cleaning practice and the welding of carbon steel, alloy steel, and stainless steel castings.

BOX 205, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

WANTED

Gray Iron Jobbing Foundry needs man with experience in all phases of foundry operation to assume duties as General Foreman. If qualified, send complete resume stating experience and salary requirements. Address: Box 216, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

ASSISTANT MANAGER

Metallurgical engineer well experienced in all phases of gray iron, mechanized, captive foundry operations including shell, CO^2 process and newest developments, cost and quality minded, good labor relations. Presently employed, desire similar position with a progressive company. Address: Box 182, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ASSISTANT TO MANAGER

Mechanical engineer, age 32. Eight years' diversified experience, including foundry equipment sales engineering. Energetic administrator. Seeking management position requiring creative ability, drive and initiative. Consider product-process development, sales, etc. Address: Box 181, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT

Practical gray iron foundryman, age 53, technically trained, graduate metallurgist. Broad background of experience—jobbing, paper machinery, machine tool, automotive. Desire contact with reliable firm needing service of high grade foundryman for results. Address: Box 198, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

NOW AVAILABLE

Experienced consulting sales engineer. Investment casting field preferred. Familiar with Illinois, Wisconsin and Indiana territory. Must furnish car, draw against commission and expense account. Address: Box 217, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER

Thirty-two years' experience covering gray cast iron, malleable cast iron, pearlitic malleable cast iron, and cast steel. Experience in automotive, agricultural, stove plate and enamelware castings. Work background—manager, foundry consultant, sales engineer, operating foreman and metallurgist. Aggressive. Salary open. Address: Box 209, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT

Age 42, 27 years experience ferrous and nonferrous. Practical and technical. Proven ability ductile iron, Meehanites, aluminum and silicon bronzes, etc. All types cupolas and furnaces. Desire good stable position with progressive company. Address: Box 214, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

IRON FOUNDRYMAN

Thoroughly experienced oldest or newest type foundry. Want challenge and responsibility. Now employed, locate New England only. Address: Box 197, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WHAT HAVE YOU?

Twenty-six years' gray iron, bronze and aluminum, job and production foundry experience. Some college education and college teaching experience. Eighteen years supervisory capacity, melting, coremaking, molding, patternmaking, sales, engineering, bid estimating, procurement. Would consider foreign duty. Now employed. Age 43. Address: Box 179, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 213, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

Steel or iron, coat-off, sleeves-up type man. Jobbing or mechanized. Address Box 196, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

Young Englishman, 26. Apprenticeship, 3 years technical college. Experienced coremaking, chill-casting, machine, bench and floor molding. Some machine shop, estimating and drafting experience. Relocate anywhere. Address: Box 224, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

With broad experience, technical, operating and executive both U. S. and Europe, available for trouble shooting or consulting during period October 15-April 15. Address: Box 208, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

POSITION WANTED

South America, Mexico, Foreign. Capable, aggressive young executive with diversified administrative and technical background, requests opportunity, steel, gray iron, malleable. Address: Box 176, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

POSITION WANTED

Twenty-five years' experience in coreroom supervision both steel and gray iron, in jobbing and mechanized foundries, on blowers, rollover and bench. Excellent references. Address: Box 219, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PATTERN SHOP SUPERINTENDENT

With 32 years of pattern shop supervision including 20 years operating own job shop, employing 8 to 12 wood and metal patternmakers, and was able to solicit, quote and supervise the construction at a profit. Address: Box 180, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PLANT MANAGER—ENGINEER

Present gray iron and aluminum foundry manager desires change. Experience scrap and sand control, metallurgy, sales, production control, union negotiations. Engineering experience, plant layout, manufacturing, tooling, structural steel. Address: Box 188, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN

Fifteen years' foundry experience, three years in Meehanite supervision, twelve years' apprenticeship and journeyman time in steel. Age 34. Willing worker, desire position with future. Address: Box 221, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Practical and technical, 30 years' experience jobbing and production. Familiar with every phase of the foundry. Now employed. Address: Box 228, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thorough knowledge of all phases of nonferrous metals. Understand gating, jobbing, floor, machine and plumber supplies. Can also produce pressure tight and porous free castings. Know sand control and core room work. Address: Box 222, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS

Confidential Inquiries Invited
From Employers and Qualified Applicants

For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

SALARIED PERSONNEL

$5,000-$30,000. This nation-wide service successful since 1927 finds openings in your field. Sells your abilities; arranges contacts. Present position protected. Write for details. Address: JIRA THAYER JENNINGS, P. O. BOX 674, MANCHESTER, VERMONT.

LOOSE PATTERN BENCH MOLDER

Gray iron, brass or aluminum, 29 years' experience, 49 years old. Free to relocate. Address: Box 202, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLEANING ROOM FOREMAN

With 25 years' experience processing castings of all kinds. Free to relocate. Address: Box 191, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Available

REPRESENTATIVE AVAILABLE

Eastern foundry equipment representative looking for a few additional lines. Engineering and sales experience with good coverage and services. Address: Box 220, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVES

Foundry consulting organization offers non-conflicting opportunity to initiate new contracts for precision casting process. Replies held in strictest confidence. Address: Box 231, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

SALESMEN TO CALL ON FOUNDRIES

Sell nationally known line of quality controlled foundry products—core oils and binders, washes, sand additives and compounds, etc. Major manufacturer now doing multi-million dollar sales volume in a few states is undertaking an expansion program. Men with some foundry "knowhow" preferred. This is a full time opportunity with a challenging financial future. Our organization knows of this advertisement. Reply in strict confidence giving educational background, experience, references, age, marital status, etc.

BOX 201, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

AGENCIES

LOW COST producer of small repetition malleable castings with extensive mechanized foundries in U.K. currently exporting to U.S.A. seeks agents conversant with outlets for this class of work. Address: Box 223, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Experienced nonferrous metal salesman and buyer—Eastern United States. Reply advising experiences and other information pertaining to former or present connection. Address: Box 215, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVE WANTED

Medium sized gray iron job shop specializing in first quality machinery and tooling castings wants manufacturers' representative to cover Chicago area. Address: Box 210, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundry Consultant

CONSULTING ENGINEER
Thirty-five years' Experience
Acid and Basic Practice

Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing, and organizing of your melt shop.

EUGENE H. WEAK **2933 HIGHWAY AVE.**
HIGHLAND, IND. **PHONE: TEMPLE 8-1244**

Positions Wanted

FOUNDRY CONSULTANT—NONFERROUS

Sand — permanent mold — centrifugal permanent mold—and centrifuge permanent mold. High pressure castings a specialty. Address: ED JENKINS, 253—8th STREET, WEST PALM BEACH, FLORIDA, PHONE: TEMPLE 2-8685.

PRECISION CASTING

Layout, planning, equipment design, processing techniques, marketing. Will accept short or long term assignments. Address: Box 229, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Opportunities

PERMANENT MOLD METHOD AVAILABLE

THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

FOUNDRY PROCESSES

Have you an idea, product, service, or process, that would benefit the foundry industry. Rapidly expanding consultants are interested in acquiring new projects. Address: Box 227, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Foundries For Sale

FOUNDRY FOR SALE

Operating profitably, sales $4,000 a week. Price $50,000, 50% down.

BOX 232, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

FOR SALE, LEASE, OR JOINT VENTURE

Pressure cast aluminum foundry and pattern shop, now active, specialize in plaster cast aluminum pattern equipment. Sufficiently equipped to produce fifty plates a week. Low price in rent, room for expanding. Good opportunity. Address: EDWARD SWANSON, PRES., ASHLAND PATTERN AND MODEL WORKS, INC., 163-5 CLYMER STREET, BROOKLYN 11, NEW YORK.

FOR SALE

Completely equipped brass foundry, strictly modern. Located at Kane, Illinois. For further information contact: C. H. AUTEN REAL ESTATE AGENCY, 2415 STATE STREET, ALTON, ILLINOIS, PHONE: 3-8522.

HAVE YOU EVER NOTICED

the many types of headings under which classified ads are listed? There's one for every want—if you want to obtain qualified personnel, want to sell used machinery, want to buy equipment, or want a better position, you should advertise in the classified section of FOUNDRY.

FOUNDRY has 75,000 readers. They represent a readership which covers the entire foundry industry. What does this mean to a classified advertiser? It means that for a nominal sum you get the widest possible coverage of the industry. Your message reaches "just the right people".

classified
advertising dept.
Foundry ★
Cleveland 13, O.

Foundry Wanted

FOUNDRY WANTED

Young man with eight years' supervisory experience in foundry, machine shop, core, and pattern departments, wish to make arrangement with owner of fairly small brass and aluminum foundry who wishes to gradually retire over a six month to two year period. Excellent character, hard worker. Interested mainly in the New Jersey, New York, Connecticut, Pennsylvania, Maryland area. Only interested in a profitable operation. Am prepared to put cash down. Address: Box 218, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

EQUIPMENT WANTED

One aluminum heat treat furnace, pit type, 48" dia., 60" deep, electric.

CURTO-LIGONIER FOUNDRY CO.
1215 NORTH 31st AVENUE
MELROSE PARK, ILLINOIS

CUPOLA BLOWER WANTED

Ingersoll-Rand FS-533 or Spencer 1540-H or equal.

BOX 204, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

INDUCTION FURNACE WANTED

One 20 to 50 KW induction melting furnace complete. 960 or 3000 cycle, 440 V. Address: Box 211, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MIXER WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

M.G. high frequency steel melting furnace approximately 30 to 100 K.V.A. Address: BURDEN BROS., 54 DERBY ST., LIDCOMBE, N.S.W. SYDNEY, AUSTRALIA.

For Sale

FOR SALE

Pangborn Rotoblast Type ES-192, designed for cleaning of bath tubs. Unit complete with Schneible Collector, 825 gallon skim tank—two pumps. Blast cabinet 45'6" x 11'6". Seven rotors with 20 HP motors, 36 hooks on trolley conveyor—2 grit elevators, 6 separators. Spare parts inventory included. Unit offered on as is—where is basis.

RHEEM-RICHMOND PLUMBING FIXTURES
DIV. RHEEM MANUFACTURING COMPANY
P. O. BOX 111
METUCHEN, NEW JERSEY
Attention: Purchasing Department

FOR SALE

#1 SIMPSON MULLER
PORTABLE — LATE MODEL
NEWAYGO SHAKEOUT VIBRATOR
26" x 42" with 10' conveyor
Belt-Portable-Pneumatic tires
FOR THE BEST DEAL CALL
BALCHER MACHINERY COMPANY
695 E. 152ND STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

FOR SALE

1—REDA FURNACE—MODEL 1000, like NEW. Never used.

MC BRIDE & SHOFF, INC.
METAMORA, ILLINOIS

FOR SALE

Beardsley & Piper Sandslinger, Serial No. 900462610, 120" swing 48" vert., motor 1150 and 1720 RPM. Portable electric type with car wheels on roller bearings. Includes considerable repair parts. Address: ROBERT HOLMES & BROS., INC., 510 JUNCTION AVENUE, DANVILLE, ILLINOIS.

FOR SALE

#3 Whiting cupola, complete, like new, never used, still has shipping tag attached. Address: ELWOOD PATTERN WORKS, INC., 125 NORTHEAST STREET, INDIANAPOLIS, INDIANA.

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

FOR SALE

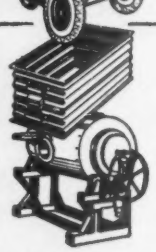
Simpson No. 1 Muller
Simpson No. 2 Muller
American Tumblast, 36 x 42
Fisher Furnaces #600 MNP
Coulter Furnaces #400 MNP
J & J #815 Jolt Rollover Pattern Draw Machine
Stedman Core Crusher, Hammer Mill
American Turnings Crusher #3800
Osborn #405 Rollovers
Elevators
Belt Conveyors
Shakeouts
International Rollover RES
Milwaukee 163 Jolt Stripper
Champion JSL 12 Pin Lift, jolt
Osborn 710J, Pin Lift
Osborn 212J, Jolt Squeezers
Osborn 275J, Jolt Squeezers
Osborn 276J, Jolt Squeeze
International LJS, Jolt Squeeze
International PJS, Jolt Squeeze
Milwaukee 104 Jolt Squeezers
Champion JS 10S Jolt Squeeze
Arcade 100S Jolt Squeeze
Spo 110 Jolt Squeeze
Davenport Rollover 28 SA
International Rollover 30 x 8 portable
International Rollover 2410 G portable
International Rollover 30 x 8 no jolt
Tabor rollover 30 x 40 portable
J & J 610 B rollover portable
J & J 918 Rollover
International pin lift
Davenport pin lifts
Osborn 559 pin lift
Spo 506 jolt rollover, pin lift, draw
Nichols plain molding machine, high speed
International plain jolt, 36 x 45 table
International Type R core rollover, hand
Swing Grinders
Royer sand preparators
Simplicity preparators
B & P preparators
Blystone sand mixers
American Sand Cutters, Models M, AM, AA
Coleman core ovens
Porbeck core ovens
Grinders ½ hp to 25 hp
Disc grinders
Ladles from 50 lb. to 10,000 lb.
Pouring Devices 500 lb. to 2000 lb.
Gyratory riddles
Monorail and bridges
Air Hoists 250 lb. to 10,000 lb.
Overhead chain conveyor #458, track, drives.
Blowers-Centrifugal-positive-exhaust
Dust collectors all sizes

FLASKS
ALUMINUM
SLIP and POP
Sizes from 10" x 10" to 48" x 48"
JACKETS
Aluminum and Iron
STEEL FLASKS
Sizes from 10" x 15" to 9' x 9'
CORE PLATES
Transite —— Iron —— Aluminum
MANY OTHER ITEMS IN STOCK
SEND US YOUR INQUIRIES
WE BUY — SELL — TRADE

THE HOMAN MACHINERY CO.
710 E. FRONT ST. MAIN 10339
CINCINNATI 2, OHIO

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD — CLEVELAND 10, OHIO



DUST COLLECTOR
1—Whiting Hydro-Clone, wet type, 4,000 c.f.m.
1—Roto-Clone, wet type, 5,000 c.f.m.

WHEELABRATORS
1—27" x 36", 5 cu. ft. Tumblast, w/loader
1—36" x 42", 11½ cu. ft. Tumblast, w/loader
1—42" x 48", 17½ cu. ft. Tumblast, w/loader
1—36" x 42" air blast Wheelabrator

CRANE
1—Overhead CAB operated, 40 ft. span, 5 ton

HEAT TREATING FURNACES
2—4860EH Lindberg, 220 Volts, 90 KVA.

SAND SLINGERS
1—B-P Riddle type, 19" head, 4" tip
1—B-P Motive Jr., 19" head, 4" tip
1—B-P double belt, 19" head, 4" tip

SWING GRINDERS
10—10 H.P. Mummert-Dixon Model 1814
3—25 H.P. Safety Grinding Wheel Model 204

ELECTRIC FURNACE:
1—350 lbs. Detroit Rocking

ASK FOR OUR COMPLETE LISTING — GLENVILLE 1-1222

Circle 906 on Page 131

CLASSIFIED ADVERTISING

For Sale

FOR SALE

1—Simpson #0 Muller—Style M (never used).
1—Lancaster Stainless Steel Counter-Current Batch Mixer, Type LW-62.
1—Lancaster Mixer, Model EBG-4.
1—Lancaster Mixer, Model EAG-3.
1—Ingersoll Rand Air Compressor, Type PRE-2, 24" x 16", 100# pressure with 300 HP motor.
3—Link Belt Roto-Louver Rotary Dryers, Models, 307-10; 310-16 and 502-20.

R. GELB & SONS, INC.
U. S. HIGHWAY 22, RAHWAY VALLEY R.R.
UNION, NEW JERSEY

FOR SALE

All of our foundry equipment, including two electric furnaces, cupolas, compressors, Wheelabrators, Surface Combustion box type oven, core ovens, molding machines, casting bins, in fact our complete foundry.

MEMPHIS CASTING WORKS, INC.
1006 OAKLAND AVENUE
MEMPHIS 1, TENNESSEE

FOR SALE

MOTORS—GENERATORS
TRANSFORMERS
Unused—Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone station Collect GLenwood 3-6783
P. O. Box 51—Rochester 1, New York

For Sale

FOR SALE

WHITING CUPOLAS—several sizes with blowers and skiphoists.
MOULDERS' FRIEND—sand conditioning (large size).
OSBORN—Jolt Squeeze #276 PJ, 13" cylinder.
MIXING LADLE—2500# capacity, with hydraulic control.
ELWELL-PARKER—2000# capacity Transporter with charger.
DEMMLER—#50 Core Blower—only $175.
This equipment is priced to move—it is in splendid condition.

PHONE OR WRITE:
W. O. McMAHON
BOX 5943, HOMEWOOD STATION
BIRMINGHAM 9, ALABAMA
PHONE: TREMONT 1-2088

FOR SALE

3—Whiting coal pulverizers #15, complete, used only 2 months, sell very cheap
15—tons fine grind standard 78% Ferro Manganese
60—#150 Dixon Clay Graphite tilt and non-tilt crucibles, sacrifice this material.

JOSEPH ADAMS
4425 E. THOMPSON ST.
PHILADELPHIA 37, PA.
PHONE: JEFFERSON 3-4296

FOR SALE

Two station sand handling equipment with shakeout. Supplies ample sand for continuous molding. Purchased in August of 1956 from Industrial Products Engineering Company, used 1800 working hours. Practically new. $2,000.

Address: **WAGNER ALUMINUM FOUNDRY, COLBY AVENUE, MANASQUAN, NEW JERSEY.**

For Sale

SAND BLAST EQUIPMENT
SELL-BUY-TRADE
GUARANTEED MACHINES
TERMS: 3 YEARS TO PAY

$70,000 worth new Pangborn and Wheelabrator parts. Priced 25% less than list.

6' LF-14 Pangborn Table	$2000.00
4' LG-14 Pangborn Table	2200.00
9' LG-14 Pangborn Table	4500.00
6' LG-14 Pangborn Table	2500.00
Pangborn 8 x 8 Room	2800.00
Pangborn 55 EN2 Hand cabinet	325.00
Pangborn Auto Peening cabinet	1100.00
48 x 48 Wheelabrator Tum. w/loader	4000.00
42 x 48 Wheelabrator Tum. w/loader	2500.00
4' American Multi-Table	2500.00
15" Continuous Wheelabrator Tumblast	1000.00
8' Wheelabrator Table Blast	2000.00
14 LG5 Pangborn Rotoblast Multi-Table w/5—5' tables	9000.00
Pressure Tanks, all types	150.00 up
Vapor Blast cabinets	400.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES, INC.
5654 W. Jefferson
Detroit 9, Michigan
VI-3-6750

Now Liquidating

Oliver Corporation's Gray Iron and Malleable Foundries at 533 S. Chapin St., South Bend, Indiana. LATE TYPE Foundry Equipment.

FOUNDRY

10—MULLERS, 5—B&P #80; 1—B&P #60; 2—B&P #40's with skips; 2—Clearfield #930, with new style crossheads.

8—MOLDERS HOPPER LINES—150 Hoppers.

10—"NO LEAK" Steel Slat Conveyors.

3—MOLD CONVEYORS.

20—Belt Conveyors, Trough and Flat Belt, some have magnetic pulleys.

8—Revivifiers and Sand Screens.

8—Overhead Sand Bins 1000 to 4000 cu. ft.

11—Shakeouts: Robbins, Simplicity, Link-Belt.

5—Oscillating Pan Conveyors.

9—Bucket Elevators 41 to 60 feet.

B&P Slinger, Turntable, Plate Feeder.

120—MOLDING MACHINES, JOLT SQUEEZE PIN LIFTS: SPO 2222, 2160C, 2160, 2148, 2136, 214, 113J, and 110J; OSBORN 276J and 275J. ROLLOVERS: SPO 507, and 506; JOLT SQUEEZE ROLLOVER DRAW 413D, PIN PUSHOFFS B&P AL2428.

7000' Roller Conveyor 12" to 26".

CLEANING ROOM

American Shot Blast, 3-48" x 48"; 3-42" x 36"; 4 Whiting geared motor drive tumbling barrels—12—HISEY WOLF Grinders, 30" to 18" wheel sizes—Wood Slat casting sorting conveyors.

3—Whiting Hydroclone Dust Suppressors.

5—Rotoclones—3 Bay type Dust Collectors.

CORE ROOMS

Core Blowers: 3—Demmler 2K, 2 Demmler #2; 4 Demmler #1; 1—Demmler #50; 2—International SB13; 9—Redford Bench type Rollovers; 1—Spo 507; 2—Spo 506; 1—International R.E.D.P. 6—Hand Rollovers. Coleman Car type and Young Brothers continuous core ovens, core racks, core buggies.

HEAT TREATING

4—General Electric 5 Ton Electric Annealing ovens 1750° and 1350°.

MELTING DEPARTMENT

Cupola—4 Whiting #7; 1—Whiting #6.

WHITING HYDROARC ELECTRIC DUPLEXING FURNACE, 4130# cold charge, 4160 volt, 1100 KVA.

2—Whiting Air Furnaces, 2—30A Coal Pulverizers.

2—Whiting 7½ Ton OET 107' span.

Whiting Tiger Charge Crane—3 Whiting U holding ladles. Overhead scrap storage, charge and weigh hoppers, Canton Shear, 55" Magnet.

3—Whiting Allis Chalmers Cupola blowers. Whiting Slag Disposal Units.—36 Modern Pouring devices, Scales 100# to 12,500#.

CRANES

2—Whiting 7½ Ton 108' Span OET Cranes.

35—CLEVELAND Bridge Cranes, 800' 10" arch beam, 2000 feet "T" Rail.

12—CLEVELAND Hot Metal Carriers, 2600'-10" Arch beam rail.

11—Electric Monorail Hoists 1—5000#.

3 STRAIGHTENING PRESSES: 500 TON H.P.M.; 50 TON and 25 TON OIL GEAR.

AIR COMPRESSOR—300 H.P. Synchronous Chicago Pneumatic.

WRITE • WIRE • PHONE

ACME EQUIPMENT CO., INC.

LIQUIDATION OFFICE: Phone Atlantic 9-9263 533 S. Chapin St. P. O. Box 486 • South Bend, Indiana
Chicago Office & Warehouses • 126 S. Clinton St., Chicago 6, Illinois • ANdover 3-3430

UNIVERSAL REBUILT EQUIPMENT GUARANTEED

AIR COMPRESSORS

COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

BLOWERS

25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure & Cent. Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS

1—20" x 27" AMERICAN WHEELABRATOR, Rubber Belt
1—27" x 36" AMERICAN WHEELABRATOR TUMBLAST, Rubber Belt
1—36" x 42" AMERICAN WHEELABRATOR TUMBLAST
1—48" x 42" AMERICAN WHEELABRATOR TUMBLAST, w/loader
1—36" Continuous AMERICAN WHEELABRATOR, side discharge, two heads, Serial #A95643. New 1953. Used 2 months
1—#1-A Multitable AMERICAN WHEELABRATOR, 6-26" tables, New in 1954, w/dust col.
1—PANGBORN TABLAST, 8' Table, 2500#
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round
4—SLY, 48" x 36" Round, complete

CONVEYORS

1—JEFFREY, 3 compartment, ingot mold
1—LINK-BELT, vibrating, 80' x 24", w/exhaust hood
1—LINK-BELT, CAR type mold, 114 cars, 403' track, car size 18" x 42"
2—LINK-BELT, 30" Steel Apron Conveyors, 100' Centers
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES
200 ft. WESTOVER Track w/100 Aluminum Pallets 31" x 19"

CORE BLOWERS

10—DEMMLER #1, #2, #2A, #2K, #3K, #4E
3—INTERNATIONAL SB-13
3—OSBORN #91, #192, #91-10
1—RANDALL MODEL "A," Bench Type
1—TACCONE #4D, 10" Draw Stroke Cyl.

CUPOLAS

1—SKIP CHARGER for #9 Cupola with scale and buckets
1—WHITING Skip Charger for #5 Cupola
2—WHITING #7, 7 ton cap. Never used. Fraction of cost!

DUST COLLECTORS

1—AMERICAN WHEELABRATOR, Model #115KD, 20' L x 9' W x 9' H
10—ROTOCLONE #12, Type N, #14D, #16W, #20D, #24W, #30W

FURNACES—DIRECT ARC MELTING

1—250 Lb LECTROMELT, Side Charge
1—500# LECTROMELT
1—3000 #/hr LECTROMELT
1—3000# HEROULT
1—3 Ton SWINDELL Hyd. Top Charge, 3000 KVA Transformer, Latest Type

FURNACES—INDIRECT ARC

1—350# DETROIT LFA
1—750# DETROIT LFY, Conical Shell
1—1000# DETROIT AA, 300 KVA
1—3000# DETROIT C, 500 KVA

FURNACES—INDUCTION MELTING

1—3 KW, AJAX, Lab type
1—35 KVA, AJAX SPARK GAP, High Freq.
1—333 KW, AJAX, 1000# steel

FRACTION OF COST
3 Ton Top Charge
SWINDELL ARC FURNACE
Unit is in Excellent Condition.
IMMEDIATE DELIVERY

FURNACES—GAS & OIL

1—FISHER MNP, Gas Tilting, 1700#
1—400# FISHER MNP, Gas Fired
1—400# FISHER, Oil, Stationary
1—250# FISHER, Oil, Tilting
3—Stationary, Gas, 250# to 1000#
1—HAUSFELD, Tilting, 1200# capacity
1—STROMAN, Gas, 1000# cap. Alum., auto control hyd. tilt.
1—STROMAN, Gas, 600 lb, "U" Type

FURNACES—HEAT TREAT

1—2' x 3' x 6' gas fired, 1800° F.
1—4' x 4' x 10' Gas Fired Annealing
1—20" x 24" deep, L&N Homocarb electric
1—20" x 36" L&N Draw electric

MOLDING MACHINES

Jolt Rollover Pattern Draw

3—J & J #1020, 50" x 60" Table, 3000#
1—J & J #918, 44" x 54" Table, 18" draw
2—HERMAN 10,000#, 48" x 109" tables
1—HERMAN 6000#, 42" x 78"
1—HERMAN 3000#, 30" x 66" table
5—HERMAN 1500# to 30" x 48" tables
3—HERMAN 750# to 30" x 36" tables
2—INTERNATIONAL, 13" x 17" tables
1—OSBORN #602, 36" x 26", 900#
1—OSBORN #405, 3000#, flask size 64" x 57", 26" draw
1—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000# capacity
2—TABOR 30" x 40" w/air clamps, 1000#
1—TABOR 22" x 42", pattern draw, shockless, portable, 600#
1—TABOR 20" x 30" w/air clamps, 1000#
2—TABOR 14" x 16" Rockover, 150#

Plain Jolt

2—DAVENPORT, table sizes 24" x 27", 30" x 30", 1200# to 1800#

Jolt Pin Lift

1—HERMAN #4317, 22" x 30" table
1—J & J #681-C, 30" x 25" table, 600#
1—MILWAUKEE #1536, 32" x 38", 1500#
1—OSBORN #559, 25" x 30" table, 6" draw, 1200#
3—SPO #305, #307, 750 lb, 1500 lb
1—TABOR 17" x 20" table, portable
1—TABOR 20" x 24" table, 600#

Jolt Squeeze Pin Lift

2—INTERNATIONAL PKL, 18" x 24" table, 12" sq., 5½" draw, stat.
1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200#, 8" draw
2—MILWAUKEE #163, 15" x 24" table, 11" sq., 1500#
2—MILWAUKEE #165, 24" x 30" table, 16" squeeze
5—OSBORN #712J, #712PJ, 18" x 28" table, 12" sq., 6" draw, stat. & port.
1—OSBORN #716 PJ, 22" x 34" table, 1250#, 7" draw, stat.
5—SPO #2114P, 21" x 27" table, 600#
5—SPO #2136G, 21" x 30" table, 800#

Jolt Squeezers

4—INTERNATIONAL #10 LJS, 17" x 20"
1—MILWAUKEE #104-5, 17" x 21", port.
1—NICHOLS #12 F-P, portable, 600#
31—OSBORN #275PJ, #275J, 17" x 20" tables, 10" sq., 400#, stat. & port.
3—OSBORN #276J, 17" x 26" table, 13" squeeze, 500# port.
2—SPO #110J, 17" x 20" table, port.
8—TABOR 3" jolt, 18" x 20"

MATERIALS HANDLING

1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—CLARK, Fork Lift, Gas, 3,000 lb, capacity. Solid Tire
1—HOUGH PAYLOADER, Model HA, 1000# cap., hyd. lift, mech. dump

MULLERS AND MIXERS

1—B & P #3½ Mulbaro, 3½ cu. ft. batch
1—B & P #30 Speedmullor, 3 cu ft batch
1—B & P #70 Speedmullor, 15 cu ft batch with cooling and skip loader
1—B & P, Conventional, SIMPSON type, 87½" Dia, arranged for cooling
1—CLEARFIELD #404, 4' Dia, 4 cu ft batch
1—CLEARFIELD #610, 6' Dia., 10 to 14 cu ft batch, w/loader
5—SIMPSON #0, U.D. 3' Dia, never used
1—SIMPSON #1, U.D., 4' dia., 4 cu. ft. batch
1—SIMPSON #2, 6' U.D. Dia. 14 cu ft batch
1—SIMPSON #3, 8' Dia. Unit Drive, with loader 20-25 cu ft batch

LADLES AND POURING DEVICES

Bottom Pour

2—MODERN Crane Type, 55" H x 50" top
1—MODERN Crane Type, 60" H x 60" top

Lip Pour

1—WHITING 40" x 40" top dia. geared

Cylindrical

8—WHITING, 26" L x 25" dia, 1100# iron
7—WHITING 19" L x 22" dia, 600# iron
3—WHITING, 38" L x 28" dia, 2200# iron

Pouring Devices

11—WHITING, 650# to 2000# gross cap.

OVENS

1—COLEMAN, Gas, 2 Comp. and 5 drawers, O.D. 22" x 12' x 10'
2—GENRICH, Elec., 3 drawer, preheating, auto-control, 9' H & 8' W x 6'7" L
1—KOCHS BROS. Electric, 36" x 40" x 64" inside
1—PORBECK, oil, 5 drawer core oven
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½' x 14' x 7'
1—THERMONIC Dielectric Core Oven, Model M900-A

SAND CONDITIONING

2—B & P Screenarator, Model "S" & "M"
1—JEFFREY Sanditioner, Portable, 10-15 tons/hour, 2 H.P. Motor
2—ROYER, NC-2, 10-15 tons/hr, 1½ HP motor
1—ROYER, NC-4, 10-15 tons/hr, 1½ HP motor
1—ROYER PREPARATOR, Comb. Model NDC, 25 ton/hr scrap removal, 8' x 8' hopper
1—ROYER, NDP 15-25 ton/hr, 2 HP

SAND CUTTERS

1—AMERICAN, 15 HP, 96/78 Reel
1—AMERICAN, 10 HP, 48" Reel

SAND SLINGERS

1—B&P Stationary, 2 Speed, 19" head, 4" tip
1—B&P Stationary, Single Speed, plate feeder
1—B&P Tractor Type, 19" head
1—B&P Tractor Type, 16" head

SHAKEOUTS AND SCREENS

1—SIMPLICITY Vibrex screen, 3' x 8'
1—ROBINS Vibrating Screen, 36" x 78"
1—SIMPLICITY 50" x 116" shakeout

MISCELLANEOUS

1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5
FLASKS, CORE PLATES, All Sizes
500,000# Hyd. Compression Testing Machine
4" FOOTBURT Horiz. Bar Mill
5 Ton WELLMAN Charging Machine
1—TABOR Cut-Off Saw, 7½ HP motor
1—CLIMAX Model 2-A Wire Straightener
10 or 15 HP GRINDERS, Swing Frame
8—GRINDERS, Double End, Pedestal Type, U. S., Cinn., Gardner, 5, 7½ & 10 HP

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THE ACME BARGAIN PAGE

AIR COMPRESSORS
2—INGERSOLL RAND 450 cfm., 100 hp., 220-440 V.

BELTING
29" x 180' 24" x 152'
24" x 263' 24" x 120'

BLOWERS
INGERSOLL-RAND 10,000 cfm., 32 oz., 150 hp., 220 V.
GE 10500 cfm., 20 oz., 85 hp., 220 V.
GE 7500 cfm., 20 oz., 89.6 hp., 220-440 V.
GE Centrifugal 6200 cfm., 24 oz., 58 hp. motor
INGERSOLL-RAND 4000 cfm., 60 oz., 100/25 hp., 220-440 V.
NORTH AMERICAN 1050 cfm, 16 oz.
SPENCER 7350 cfm, 16 oz., 50 hp.
SPENCER 2850 cfm., 16 oz., 20 hp., 220-440 V.
SPENCER 2250 cfm., 16 oz., 15 hp., 220 V.
SPENCER 270 cfm., 8 oz., 3 hp., 220-440 V.

CONVEYOR OVERHEAD CHAIN
1700' JERVIS B WEBB and LINK-BELT #678 with trolleys 36" centers. 2-5 hp. Variable speed caterpillar drives, & motor generator set, takeups and turns.

CONVEYOR
36" x 162' LINK-BELT Oscillating Pan 10 hp., 220-440 V.
36" x 53' LINK-BELT Oscillating Pan
17' BARBER GREEN Bucket Conveyor
30" x 25' Magnetic Belt Conveyor w/drives, 2 hp. 220-440 V.
18" x 10' Steel Apron Conveyor w/drives, 3 hp., 220-440 V.
16" x 120' Rubber Belt w/drives

CORE BLOWERS
DEMMLER #2, 20# cores
DEMMLER #2K, 20# cores
REDFORD #2 up to 5# cores
REDFORD Bench types, horizontal or vertical clamping
2—CB15 55# cores, Universal blow plate C.B. 10 up to 12# cores, 4½" draw
DEMMLER #4 up to 250# cores
INTERNATIONAL SB15H, up to 150# cores, Hydraulic clamp and draw
INTERNATIONAL SB 13, up to 60# cores
INTERNATIONAL SB 12, medium sized cores
INTERNATIONAL SB 11, medium sized cores
6—OSBORN 193 up to 50# cores
OSBORN 2035-2 large sized cores

CORE GRINDERS
7—MILWAUKEE 70-9 & 70-12s
1—OWOSSO DE1-303 42" table

CORE OVENS TOWER
COLEMAN Vertical-Horizontal 9000# per hour
COLEMAN Vertical-Horizontal 6800# per hour

CORE PASTE OVENS
COLEMAN 28' Horizontal

CORE ROLLOVERS
INTERNATIONAL REDP Rollover 12" draw

CRANES
P&H 5 TON Electric Traveling DC motors 50' span
P&H 3 TON Electric Traveling DC motors 50' span
270' Crane Runway and Supports
10 Ton AMERICAN Railmaster Low headroom floor control

CUPOLA GUNS
2—BONDACTOR #1250
BONDACTOR #1000

DUST COLLECTOR
PARSONS 40,000 cfm. cloth bag type

ELECTRIC MELTING FURNACES
SWINDELL 9' Dia. Top Charge cap. 3 ton steel 5 ton iron per hour, 3500 KVA 13800 volt transformer, complete in place
1—"LECTROMELT" 2 TON Size Q 4000# per hour 1500 KVA 13200 Volt
LECTROMELT 500#, Size T, 300-375 KVA 2300 V primary, Moore controls, G.E. circuit breaker

ELECTRIC MELTING FURNACES
SINGLE PHASE
1—DETROIT "LFA" 350# shell 13200 V.
1—DETROIT "LFC" 700# & 350# Tapered Shell 2300 V.
2—DETROIT "LFC" 350# Tapered shell 7200 V.

FURNACE TRANSFORMERS
1—"LECTROMELT" 800 KVA, 12000 V., 3 phase
1—WESTINGHOUSE 500 KVA, 11200 V., 3 phase
1—WESTINGHOUSE 2500 KVA, 13800 V., 3 phase

FURNACES NONFERROUS
CAMPBELL HAUSFELD Staty. pot type
1—HEVI-DUTY HD-181-S Pot type, Electric
2—400# FISHER Gas Fired Tilting Furnaces
4—600# FISHER Gas Fired Tilting Furnaces
1—600# FISHER Gas Fired Stationary Furnace
FISHER RB100 Gas Fired Crucible
3—CAMPBELL HAUSFELD Gas Fired 625# brass hand tilt
1000# STROMAN DC double dipout w/complete controls

GRINDERS, SNAG
FOX 24" x 2" Single Wheel 10 hp.
2—HAMMOND 20" DE 10WR1 10 hp., 220-440 V.
1—HAMMOND 20" DE Porter Cable backstands 10 hp.
1—HAMMOND 24" x 2" x 12" 7½ hp., 220 V.
HAMMOND WR-2, 2 speed, 30" x 3" wheel

GRINDERS, SWING FRAME
MARSCHKE 24" x 3" x 12" 20 hp., 220 V.
U.S. 24" x 3" x 12" 15 hp., 220-440 V.
2—MARSCHKE 3 hp., 12" wheel
1—B&D 7½ hp.

GRINDERS, MISC.
PORTER CABLE BGS Wet-Dry Belt
U.S. #70 Combination 20" disc and 20" x 3" x 1½" wheel

HEAT TREATING FURNACES
HOLDEN #202 Electrode Type, Bright hardening annealing 1850°
DESPATCH DT36 Pit type 42" x 40" Electric
LINDBERG 48" x 48" x 72" Elec., 1250°, box type.

HOISTS
10 ton SHAW BOX electric hoist
SHAW BOX 5 TON floor control hand travel
4—INGERSOLL-RAND Air trolleys
1—500# INGERSOLL RAND LC-4
4—CLEVELAND 2000# Cab type hot metal carriers

LADLES
1—6000# Industrial Enclosed Gear Crane
1—5000# Modern Enclosed Geared Crane
3—2125# Industrial Enclosed Geared Crane

LADLE MIXING
4000# Industrial, Insulated

MOLD BLOWER
TACCONE TD4 24" x 32" flask

MOLDING MACHINES
JOLT SQUEEZE PIN LIFT
3—#165-6B MILWAUKEE TABLE, 24" x 30"
2—#125-3 MILWAUKEE TABLE, 21" x 27"—12" cyl.
2—OSBORN 712 PJ, 18" x 21" table
1—CHAMPION JSL10P 18" x 21" table 6" draw
2—#2114 G. SPO TABLE, 26" x 27"—11" cyl.

JOLT SQUEEZERS
2—INTERNATIONAL, LJS12 16" x 20" table
1—SPO, 110J Portable 17" x 20" table
4—CHAMPION, JS10P 18" x 21" table
2—OSBORN 275PJ

JOLT ROLLOVER DRAWS
DAVENPORT 28A, 1500#, 29" x 40" table
1020 JOHNSTON & JENNINGS, 60" x 50" table
JOHNSTON & JENNINGS 918, 44" x 64" table, 20" draw, rollout table
1—1500# HERMAN 26" x 48"
2—750# HERMAN 20" x 30" table
2—INTERNATIONAL RJ 20" x 12"
3—SPO 9032

JOLT PIN LIFTS
2—INTERNATIONAL 1200-8 26" x 27" table, 8" draw

PIN LIFT PUSHOFF
CHAMPION 28" x 42" table
MILWAUKEE 620ND 20" x 24" table

MULLERS and MIXERS
2—#1 SIMPSON Mullers

SAND CUTTERS
1—ROYER MCZ-43

SAND SLINGERS
1—B&P Tractor, 19" heads
B&P 2 speed 40/25 hp. double belt
B&P w/plate feeder
B&P sand slinger head w/Syntron feeder and hopper
2—NEWAYGO super Handy Sandy sand handling systems. Like new

SAWS, BAND
30" LAIDLAW, Metal Cutting hydraulic feed
30" TANNEWITZ, 3 hp., 440 V.
42" TANNEWITZ, 5 hp., 220-440 V.

SAWS, CUTOFF
DELTA Abrasive cutoff

SCALE
FAIRBANKS PRINTOMATIC 6250#

SCREENS
3' x 8' SIMPLICITY

SHAKEOUTS
3' x 5' ROBBINS
3' x 5' SIMPLICITY
5' x 6' SIMPLICITY
4' x 10' SIMPLICITY

SHOT BLAST
SLY #4, 20" x 20" w/dust collector

SPRUE CUTTERS
2—PERKINS #53 1¼" stroke
1—MILWAUKEE #85 TON

TESTING EQUIPMENT
ARLIN Automatic Rockwell, continuous type
COLEMAN 55 Spectrophotometer
BALDWIN SOUTHWARK 20,000 Tensile Tester w/load indicator and recorder
TYLER ROTAP Testing Sieve w/screens

TUMBLING BARRELS
2—ROYERSFORD, 42" x 72", chain drive, late
WHITING 60" x 72" 20 hp. drive
SLY 42" x 42" x 64" 10 hp.

WHEELABRATORS
2—42" x 48" AMERICAN Skip Loaders
1—27" x 36" AMERICAN Skip Loader
AMERICAN 27" x 36" Rubber Belt w/loader
AMERICAN Tablast 6-24" tables
AMERICAN Tablast 8-28" tables, late

WOODWORKING—PATTERNSHOP
GARDNER 30" DISC and Spindle Sander
JONES SUPERIOR 48" Double Disc
OLIVER 72DR Router or borer
BOICE CRANE 12" Planer
NORTHFIELD #4 Tilting Arbor Saw
TANNEWITZ 30 & 42" Band Saws

EKSTROM CARLSON #540 Universal Router Mill Drill

WIRE STRAIGHTENERS
AMERICAN type H rod ⅜"-⅝" cap.
2—#2A CLIMAX ¼"

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WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

1—GARDNER DENVER ADR 6¼ x 3½ air cooled, 15 HP
1—AMERICAN Size 9 x 9, horizontal w/30 hp motor
1—1-R, model XRB, 125 HP, synch. motor, L.H. cyl. 8" x 10", R.H. cyl. 13" x 10".

AIR & ELECTRIC HOISTS

85—I & R Air Motor type, sizes LC3, RC-5, A, B, C, D, D-6 & E 300, ½, 1, 2, 3 & 5 ton
15—DETROIT Air Hoists, 1, 1½, 5 ton cap.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.
85—INGERSOLL RAND Air Motor Type. Sizes RC-5, A, B, C, ¼, ½, 1 ton.
1—SHAW BOX 2 ton load lifter.
2—YALE ½ ton.

BUCKET ELEVATORS

12—LINK-BELT & JEFFREY, 30, 40, 50, 60 ft. cc. 10 x 7, 12 x 7, 14 x 7 16 x 8 buckets

CUT-OFF MACHINES

2—AMERICAN H-Rod Straighteners.
1—TABOR C10AF, 16" wheel, 10 H.P.
3—TESSEMER H & L Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLER Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. cores.
3—MILWAUKEE #3A Bench Type.
1—SPO Model SC-10-DM Shell Core Blower.
1—SAN-BLO Model CB-40-B, 40# Cores.
1—SAN-BLO Model 40P-1, w/pulsator.

CORE OVENS

1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
1—THERMONIC Model M800A Dielectric. Cap. 900#s per hour.
1—YOUNG BROS. 6' x 6' x 9' double door, rack type, gas fired.

CUPOLAS, BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—ROOTS 7,000 CFM, 50 HP motor.
1—ROOTS CONNERSVILLE Type RCS Size 20 x 60 w/75 HP motor.
1—MODERN No. 3½ Cupola.
1—CUPOLA Bondactor, style 1205-L.
1—WHITING No. 6 Cupola.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—TOCCO 20 KW Induction, 9600 cycles.
3—AJAX No. 100 & 300 Furnaces Only.
1—DETROIT Size CM — 4000# Cold Charge, 8000# Molten Metal, w/1000 KVA transformer.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP electric Tilting. Sizes 150, 400, 600, 1000, 1700, 2000 & 2400#, aluminum capacities. Gas or Oil Fired.
29—LINDBERG FISHER & CAMPBELL, HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired.
1—LINDBERG #400 BBI hand tilt
1—STROMAN Model JC Cradle Type Hydraulic tilt, 2000# capacity. Iron.
1—STROMAN, Model "U," 600# Reverberatory Hand Tilt.

HEAT TREAT FURNACES

1—DESPATCH "DT26" pit type, 38" D x 26" H, gas
1—DESPATCH "DT31" pit type, 36" D x 36" H, gas
2—LINDBERG 2236EH pit type, 22" D x 36" H, elec.
1—LINDBERG 3360G17 pit type, 33" D x 60" H, gas
1—L & N "Homo" 14" D x 16" H, elec.
1—SURFACE COMBUSTION, box 8' W x 10' L x 9' H.

GRINDERS

Swing Frame

1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
2—U. S. ELEC. Model 24, wheel 24" x 3".
1—MUMMERT-DIXON #2420, wheel 24" x 3".

Snagging

2—U. S. #64, 20" x 3", 7½ HP. 4 speed.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 30 HP, 4 speed.
3—U. S. No. 62VS, 24" wheel, 2-7½ HP motor, variable speed

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder. 16" dia. Wheel.

Horizontal Disc

GARDNER No. 124—53" wheel, 20 HP.
GARDNER No. 179, 70" dia. wheel, 40 HP.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
12—MODERN Model F-9 and FA-9 Pouring Devices, with ladles 400 to 800 lbs.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles, 2 & 3 ton capacities. Electric & Manual Tilting.

MOLDING MACHINES

Jolt Squeezers

37—OSBORN, SPO, MILWAUKEE, Portable & Stationary, 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.

Plain Jolt

1—HERMAN 8' x 12' table, 32,000# cap.
1—J&J 50 x 72 Table—5000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
1—DAVENPORT #24, 24" x 40" table
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Sizes 20" x 8", 24" x 10".
2—J&J #612, 24" x 30" Table.
4—J&J #918, 44" x 54" Table.
1—J&J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" draw, 750 lbs Cap.
2—OSBORN 643 Table 35" x 50"—2000#.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 9336, table size 22" x 28".
1—SPO Model 508, table size 28" x 30".
1—SPO 506—24" x 30" Table 10" Draw.
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 42" table, 10" Draw.

Jolt Pin Lift

3—INTERNATIONAL JDP 1600 X 10" draw, 36" x 36" Table.
2—J & J No. 685, 25 x 30 table
2—OSBORN #559, 25" x 30" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—SPO #3102, 42" x 50" Table.
1—TABOR, 22" x 32" table

Pin Lift

9—INTERNATIONAL & B & P Speed Draw. Used with Sand Slinger. Cap. 600 to 2000 lbs, up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE No. 165, 24" x 30" table, 16" sq. cyl.
3—MILWAUKEE #196, 17" x 38" Table, 19" cyl.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
9—OSBORN 714PJ, 20" x 31" Tables.
4—INTERNATIONAL PKL, 17" x 26".
1—INTERNATIONAL PK-20, Size 20" x 8".

CONVEYORS

Steel Apron

9—JEFFREY & LINK-BELT 24", 30", 36", widths. Lengths built to your specifications, with reducers & motors.

Oscillating & Vibrating

1—LINK-BELT 48" x 154', 20 HP Motor.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7'.
LINK-BELT "FLEXMOUNT"
1—8" W x 50' L x 4" deep pan
1—12" W x 21' L x 4" deep pan
1—12" W x 26' L x 4" deep pan
1—18" W x 18' L x 4" deep pan

Roller

2500' MATHEWS 6", 12", 18" & 20" wide, 2⅞" dia. roller, 1⅓" hex shaft centers, 4" channel.
500—MATHEWS 12" & 36" wide, 3½" dia. 1" hex shaft on 6' centers, 6" channel.

Mold

3—LINK-BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK-BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & Ploughs.

MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK-BELT Storage Bins, 60 to 150 tons cap.
42—MOLDERS Hoppers 1⅛ ton cap.

ROTO-LIFT

1—OSBORN No. 3161-12, New 1955

SAND MULLERS

1—B & P #40, Speed Muller, 6 cu ft.
1—B & P #50, Speed Muller, 9 cu ft.
1—B & P #60, Speed Muller, 12 cu ft.
2—B & P #70, Speed Mullers, 18 cu ft.
2—CLEARFIELD No. 610 w/skip hoist loaders. 10 to 14 cu ft batch.
1—CLEARFIELD #404, 4 cu. ft. batch
1—DRAVO-DOYLE 6 cu ft cap, Port.
1—LINK-BELT 48" x 8' Paddle Type.
1—PEKAY No. 160-1-24 Mixer Muller, single stage for 24" belt, 230 TPH.
1—SIMPSON No. 1H Style UD—500#.
1—SIMPSON #1½, Style UD, 700 lb. w/loader.
2—SIMPSON #2, Style C, 1500# w/loader.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
1—SIMPSON "PORTO-MULLER", 3 cu. ft.
2—Mixer Muller, 6 cu ft paddle type.
1—LANCASTER No. EDG-4, 5 cu. ft.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—AMERICAN "Sand Master," 102"/70" Cutting Blade—1952.
1—MOULDERS' FRIEND 60" Brush.

SANDSLINGERS

1—B & P Motive Speedslinger
1—B & P Motive Jr., 300 cu ft tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
4—B & P 8 ton plate feeders.
2—B & P 35 ton capacity plate feeders.
6—B & P Tanks for slingers

SHAKEOUTS & SCREENS

2—LINK-BELT 5' x 10', 6 ton cap.
3—SIMPLICITY 4' x 6' Model B
1—SIMPLICITY 4' x 8' Model D
1—SIMPLICITY 4' x 10' Model D.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, Single deck sifter screen, 10 HP motors.
2—ROBBINS 3' x 4' JF6—2000#.
2—ROBBINS 3' x 5' JF6—2000#.
1—ROBBINS 4' x 6' JF9—8000#.
1—ROBBINS 4' x 8' JF9—10,000#.
1—ROBBINS 6' x 10' JF11—20,000#.

SAND BLAST EQUIPMENT

1—AMERICAN 20" x 24" w/dust collector
1—AMERICAN 36" x 42", w/skip hoist.
2—AMERICAN 48" x 42", w/skip hoist.
1—AMERICAN 27" x 36", w/skip hoist.
1—AMERICAN 48" x 48".
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7-14" tables.
1—AMERICAN No. 2A multi-tablast.
1—PANGBORN #45, type MT Sand Blast Room 10' L x 8' W x 6' H.
1—PANGBORN No. 53 type EN-2 blast cabinet with dust collector.
1—PANGBORN Model 6-LF, 6' diameter plain table with dust collector.
1—PANGBORN #44NF Shot Blast Room 10' x 9' x 9'.

TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes: 30" x 48", 24" x 48", 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

AAA MACHINERY & EQUIPMENT CO.

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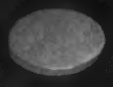

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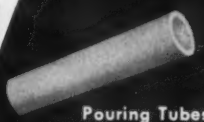

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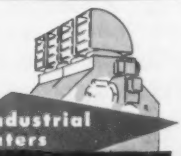

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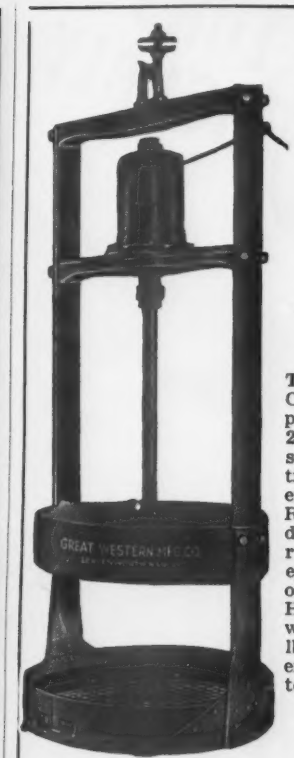

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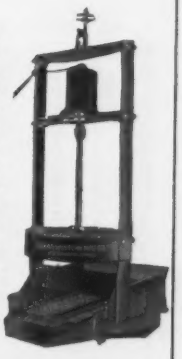

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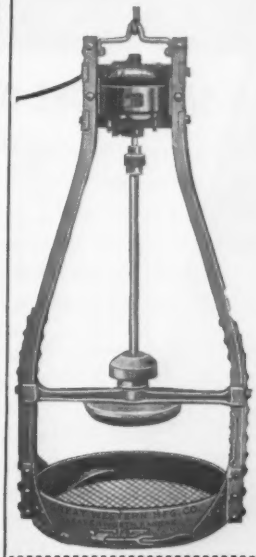

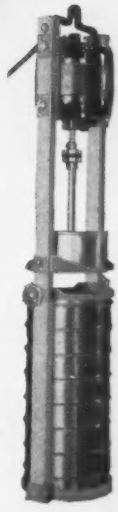

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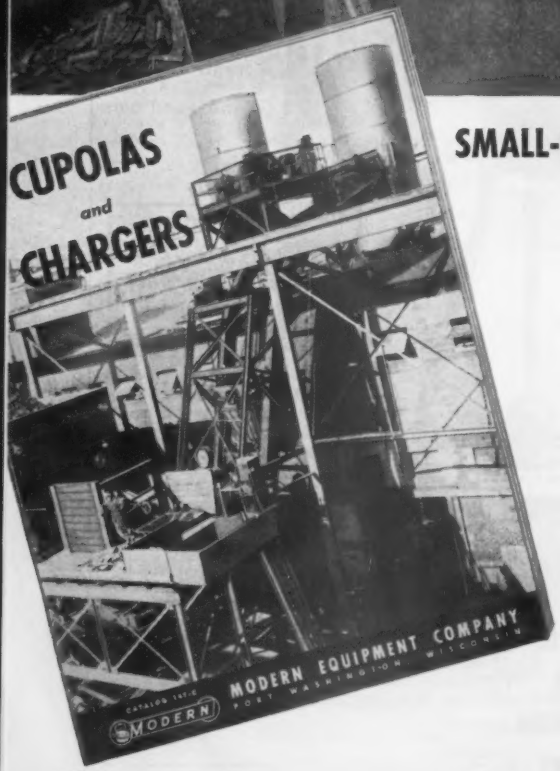

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